J. H. VAN DEVENTER
President and Editorial Director

C. S. BAUR
Vice-President & General Manager

o o o

Editorial and Advertising Offices
100 East 42nd St., New York 17, N.Y., U.S.A.

O. L. Johnson, Market Research Mgr.
B. H. Hayes, Production Manager.
R. E. Baur, Typography and Layout

o o o

Regional Business Managers

C. H. OBER, New York 17, 100 East 42nd St.
H. E. LEONARD, New York 17, 100 East 42nd St.
ROBERT F. BLAIR, Cleveland 14, 1016 Guardian Bldg.
R. M. GIBBS, Pittsburgh 22, 428 Park Bldg.
B. L. HERMAN, Philadelphia 39, Chilton Bldg.
H. K. HOTTENSTEIN, Chicago 3, 1134 Otis Bldg.
PEIRCE LEWIS, Detroit 2, 7310 Woodward Ave.
D. C. WARREN, Hartford 1, Conn., P. O. Box 81
R. RAYMOND KAY, Los Angeles 28, 2420 Cheremoya Ave.

o o o

Owned and Published by
CHILTON COMPANY
(Incorporated)

Executive Offices
Chestnut and 56th Sts.
Philadelphia 39, Pa., U.S.A.

OFFICERS AND DIRECTORS
C. A. MUSSELMAN, *President*

JOS. S. HILDRETH, Vice-President
GEORGE H. GRIFFITHS, Vice-President
EVERIT B. TERHUNE, Vice-President
J. H. VAN DEVENTER, Vice-President
C. S. BAUR, Vice-President
WILLIAM A. BARBER, Treasurer
JOHN BLAIR MOFFETT, Secretary
JULIAN CHASE, THOMAS L. KANE
G. C. BUZBY, P. M. FAHRENDORF
HARRY V. DUFFY, CHARLES J. HEALE

o o o

Member, Audit Bureau of Circulations

Member, Associated Business Papers

o o o

Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, $8; Foreign, $15 a year. Single Copy, 35 cents.

o o o

Cable Address, "Ironage" N. Y.

o o o

Copyright 1944, by Chilton Company (Inc.)

This Week in The IRON AGE

Vol. 154, No. 25 December 21, 1944

Editorial

Aim High But Have Your Gun Loaded 35

o o o

Technical Articles

Avoiding Dimpling Failures in 75S-T 39
Buckling Prevented in Welding Aluminum Sheet 44
Analyzing the Foreman's Job 46
Multiple Hole Punching Die Quickly Assembled 48
Broaching vs. Milling (Part III) 50
Physical Properties of Some NE Steels (Part II) 54
Glycerine Enhances Electrochemical Processes 58
Shankless Twist Drill Introduced 59
New Equipment 60

o o o

Features

News Front 37
Assembly Line 64
Washington 68
West Coast 72
Personals and Obituaries 76
Fatigue Cracks 78
Dear Editor 80
This Industrial Week 82
News of Industry 85

o o o

News and Markets

Canadian Steel Ingot Output Up 95
Canadian Railroad Postwar Plans 95
Precision Bombing Feud 97
J. L. Block Points to Postwar Plans 102
Batcheller Outlines Critical Programs 106
Seabees Build Shearing Machine 110
Financial Aids Available for Reconversion 112
Cast Metals Handbook Revised 122
Machine Tool Market Developments 138
Non-Ferrous Metals News and Prices 140-141
Iron and Steel Scrap News and Prices 142-143
Comparison of Prices by Week and Year 144
Finished Iron and Steel, NE Steel Prices 145
Warehouse, Semi-Finished, Tool Steel Prices 146-147
Steel Pipe, Tubing, Wire Products, Prices 148-149
Pig Iron and Coke Prices 150-151
Stainless Steel and Ferroalloy Prices 152-153

o o o

Index to Advertisers 231

MO

Introducing

STAR-MO M-2

TUNGSTEN-MOLYBDENUM HIGH-SPEED STEEL

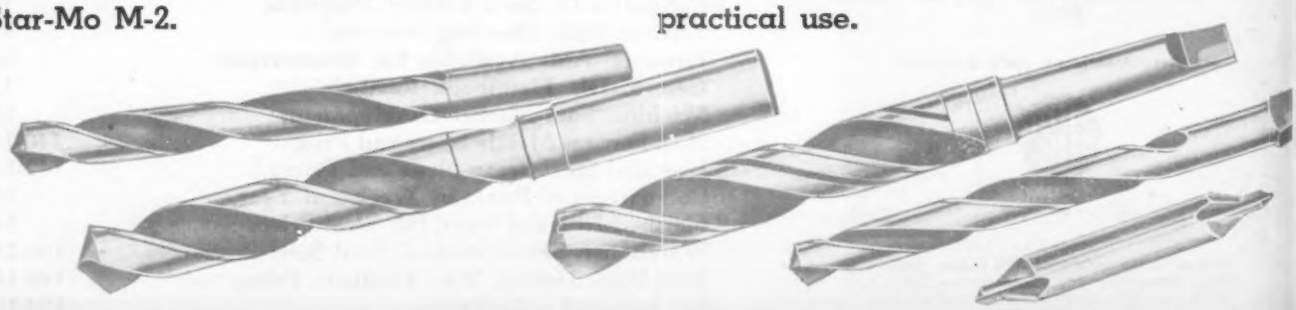
(M-2 ANALYSIS)

During the period of WPB control, Star-Mo high-speed steel conformed to Government requirements, but immediately upon removal of restrictions, late in 1943, an analysis was adopted by Firth-Sterling which was known as "M-2." Since then, all Star-Mo made has been of this new composition approved by leading automotive manufacturers and well-known tool makers. They also adopted the designation "M-2" to describe this type and we included it in the name for this new product —Star-Mo M-2.

STAR-MO M-2 is ***Better.*** On many applications it outcuts and outlasts 18-4-1 high-speed steel—a trial will prove it.

STAR-MO M-2 is ***Cheaper.*** The base price is 14% less than 18-4-1 steels, and in addition Star-Mo M-2 weighs approximately 7% less per foot. May we quote comparative prices?

STAR-MO M-2—is ***Easy to Handle.*** A Firth-Sterling representative will gladly tell you of its value on applications in your plant, methods of heat treatment, and practical use.



ARMY E NAVY

Firth-Sterling

STEEL COMPANY

OFFICES: McKEESPORT, PA. · NEW YORK · HARTFORD · LOS ANGELES · CLEVELAND · CHICAGO · PHILADELPHIA · PITTSBURGH · DAYTON · DETROIT

The IRON AGE

ESTABLISHED 1855

Dec. 21, 1944

J. H. VAN DEVENTER
President and Editorial Director

C. S. BAUR
Vice-President and General Manager

A. H. DIX
Manager, Reader Service

Editorial Staff
Editor.....T. W. LIPPERT
Technical Editor.....F. J. OLIVER
Commercial Editor..T. C. CAMPBELL

Associate Editors
F. J. WINTERS
J. ALBIN
JOHN ANTHONY
JACK R. HIGHT
S. H. BARMASEL

Editorial Assistants
M. M. SCHIEN
G. B. WILLIAMS
H. W. VAN CAMP
C. R. MUNZER
J. P. O'CONNOR
E. O. MILLER

Regional News and Technical Editors
T. E. LLOYD
Pittsburgh 22
428 Park Bldg.

C. T. POST
Chicago 3
1134 Otis Bldg.

L. W. MOFFETT
DONALD BROWNE
EUGENE HARDY
Washington 4
National Press Bldg.

W. A. LLOYD
Cleveland 14
1016 Guardian Bldg

S. H. BRAMS
Detroit 2
7310 Woodward Ave.

OSGOOD MURDOCK
San Francisco 3
1355 Market St.

Editorial Correspondents
ROBERT McINTOSH
Cincinnati

L. C. DEAN
Buffalo

G. FRAZAR
Boston

HUGH SHARP
Milwaukee

F. SANDERSON
Toronto, Ont.

R. RAYMOND KAY
Los Angeles

JOHN C. McCUNE
Birmingham

ROY M. EDMONDS
St. Louis

JAMES DOUGLAS
Seattle

Aim High But Have Your Gun Loaded

"AIM high" is a good motto, but you won't hit anything unless you have something to shoot with.

This statement reminds me of a "quickie" concerning a hunter and a lunatic. The moron came across the hunter just as the latter had shot a bird which was dropping to the ground. "Why waste the ammunition?" he asked. "The fall would have killed him anyway."

Now, of course, you who read this and I who write it do not fall into this simple-minded category. We expect to have to work for our meals and not have them drop to us from the sky without effort. But, unfortunately, there are many who, although they should know better, have been led to believe in the existence of a postwar Santa Claus.

It is quite natural that this should be so. In the distorted economy of war there are quite a few manufacturers who are turning out handsome earnings statements but whose abilities would not enable them to earn a dime in a state of normal competition. Likewise, there are a considerable number of workers taking home fat envelopes whose qualifications as producers would not ordinarily earn them standing room in a well managed factory.

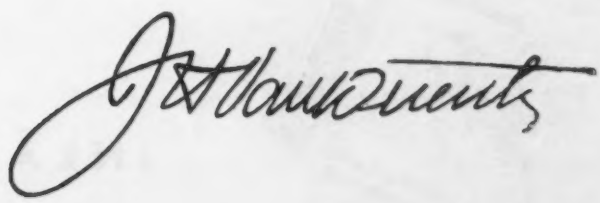
These people may be to blame for being what they are but not for being where they are. Nature is responsible for the first but war demands for the latter. And politicians and other demagogues, as well as a number of miscalled economists, are responsible for making them think that they can stay where they are and even get more for less.

The employer, who has, almost in spite of himself, seen his plant and his business double or quadruple in size and earnings during the past few years is likely to take personal credit for the accomplishment, whereas the actual reason is government credit. And the employee who listens to the Washington pronouncement of "jobs for everybody" naturally sees himself in the job he now has, with the same pay or even better.

What is going to happen to these "lame duck" employers and workers when the crutches that support them are removed?

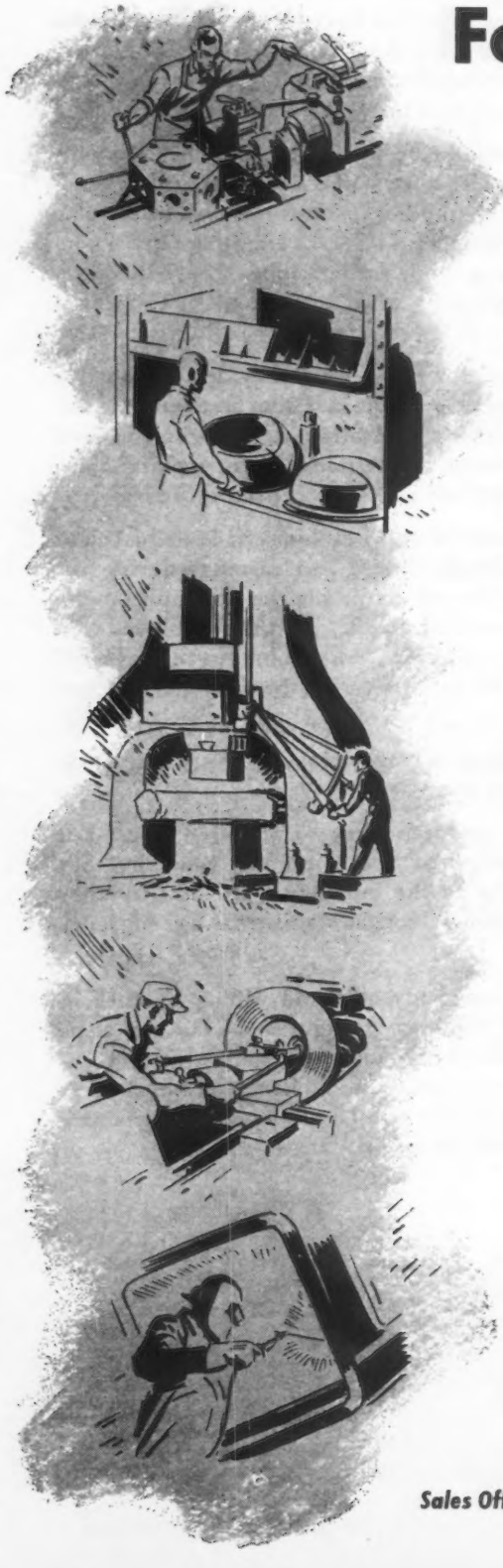
Great expectations are fine if you are willing to work for them. But they cannot be attained and maintained in a bottle fed economy with the United States Treasury acting as the milkman. In industry they must be earned individually through constantly increasing efficiency and productivity.

We can have good jobs for everybody able and willing to work in our postwar world if we get our thinking straight, and take two steps in the right direction. One of these is for our largest employer, government, to set the example of efficiency and economy in the administration of its postwar affairs. The other is for our labor unions to recognize individual productivity as the basis for priority.



Design —

For Workability With Inland Steel



Steel offers designers and manufacturers the maximum in workability. It can be formed and fabricated by all practical production methods, keeping shop costs down. It can be formed either hot or cold. It can be easily spun or extruded into many useful shapes. Steel can be deep drawn to such extremes as in the manufacture of steel cartridge cases. It can be machined, sheared, bent, seamed, welded, and brazed. And steel is available in extreme ranges of sizes and shapes, and chemical analyses; this offers a wide scope in the design of parts, and also simplifies shop procedure, reducing wastage to the minimum.

For half a century Inland has been studying the needs of industry, working with designers and production men, to make steel more useful—to give it the workability that simplifies production and assures economical fabrication. From such close contact with field problems, Inland has given industry Ledloy, the lead bearing, faster machining steel—Hi-Steel, the low alloy, high strength steel of exceptional workability—Form-Cote, the galvanized sheet which withstands severe forming—Paint-Tite, the specially treated galvanized sheet to which paint and enamel readily adhere—and many other kinds of steel that offer numerous advantages to the designer, the production man and the consumer.

Inland engineers and metallurgists are at your service to help you design, select steel, and fabricate products for today or for the post-war period.

INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Illinois

Sales Offices: Cincinnati • Detroit • Kansas City • Milwaukee • New York • St. Louis • St. Paul

The IRON AGE
December 19, 1944

NEWS FRONT

► As part of the Navy program to spend $100,000,000 a month for rocket ammunition, the Rheem Mfg. Co. has taken over a large section of the Basic Magnesium Inc. plant at Las Vegas, Nev., for the production of rocket projectiles and mortar shells.

DPC is making the necessary alterations and leasing the building. The Army and Navy are furnishing approximately $3,000,000 worth of machine tools and other production equipment.

► Official estimates indicate that the overall revision of shell and gun production programs will cost $250 million, and the mortar program $500 million, including construction of facilities.

► The match shortage may be credited in great part to military demands. The military has, for instance, taken over the entire output of book matches from the Diamond Match Co. at Chico.

A million book matches were dropped over the Philippines at the time of the invasion with the cryptic message, "MacArthur is returning".

► Molybdenite is being employed with considerable success for the lubrication of forging dies and for other applications in which heat is involved. There is some evidence that it performs better than graphite, which it, in great degree, resembles.

► A process for preparing aluminum for electroplating has been developed by the Enthone Co., New Haven, Conn. Rack or bulk work is cleaned, then dipped in the "Alumon" solution, which produces an active alloy base which can subsequently be copper or silver plated.

And: Claims are made that the plated aluminum can be soldered and subjected to severe distortion without flaking.

► In defiance of recent price increases by cement producers in southern California, Henry Kaiser's Permanente Cement Works has unexpectedly reduced its prices by 20c. a barrel.

The 12 per cent reduction was effected as a stimulus to postwar building and construction activity and to dispel inflationary tendencies. Outsiders hint some competitive angle may be involved.

► A new type cargo ship designed by another company will soon start down the assembly line at the Dallas plant of North American Aviation, Inc. The plant will continue to build P-51 Mustangs and AT-6 Texans.

The company's Kansas City plant will undertake a major sub-contract in connection with the new ship in addition to its present B-25 program.

► To release 6000 workers for "must" item production, the WPB has announced the closing of five plants producing machine guns for Army Ordance. The plants affected were working on .50 caliber machine guns which are ahead of schedule.

► Mesta Machine Co. is building an 18,000 ton hydraulic forging press, largest ever to be installed in this country. While intended primarily for the forging of magnesium, it may also be used on aluminum or other metals. No die forging press over 10,000 ton capacity has heretofore been available for production of light metal forgings in this country.

A DPC plant will be built by a subsidiary of Wyman-Gordon, Worcester, to house this new project. Production of research work on the press will be available to any company or agency having a large forging problem.

► Combining qualities of strength and toughness superior to any of the aluminum alloys used up until recently is claimed by the Aluminum Co. of America for its new Alclad alloy for airframe skins. Designated as 75S, this alloy contains approximately 90 per cent aluminum, with magnesium, zinc and copper.

In forming 75S, bend radii must be increased and a different allowance is required for springback.

► The use of glycerine in the electrodeposition of molybdenum compounds allows broadening of permissible current densities and greater pH variations. The character of the deposit is improved so that it becomes more dense, more resistant to abrasion and more adherent.

St. Paul

Avoiding Dimpling Failures in the

ALTHOUGH previous investigation of an Alclad material of similar composition had revealed no difficulty in dimpling for rivets, the introduction of Alclad 75S-T to the aircraft industry in February, 1944, presented serious fabrication problems. Shallow joggles formed by hand, and lightening holes and dimples formed with standard tooling, fractured with alarming regularity.

In the microscopic examination of this material before fabrication, it was apparent that its microstructural quality did not compare favorably with that of the conventional Alclad 24S-T. Residual stresses and stringer inclusions were observed in many of the cross-sections examined. It is assumed that these conditions were responsible for many of the fractures occurring in the severely deformed areas. The grain structure was not uniform in most gages, and it could not be identified as equi-axed. Grains were considerably longer in the direction of rolling, affording a structure more sensitive to shear failure in bending. A comparison of the grain structures at 200 diameters is shown in Fig. 1.

TABLE I

Tensile Test Averages on Alclad 75S-T

Gage In.	Code	Yield Lb. Per Sq. In.	Ultimate Lb. Per Sq. In.	Elongation Per Cent in 2 In.
0.025	C	69,367	75,567	12.0
	L	68,867	74,633	11.8
	R	69,867	75,800	12.0
0.040	C	72,175	77,850	9.9
	L	73,450	78,775	12.0
	R	73,175	78,675	11.7
0.051	C	70,275	76,350	13.1
	L	70,325	76,150	13.4
	R	70,275	76,375	13.2
0.064	C	72,000	77,600	12.0
	L	72,800	78,850	12.0
	R	73,500	79,550	12.5
0.072	C	70,850	76,725	11.6
	L	71,525	77,525	12.0
	R	70,800	77,100	11.7
0.081	C	67,750	74,125	12.5
	L	68,350	74,575	12.0
	R	68,700	74,800	12.0
0.032	..	63,500	72,300	12.0

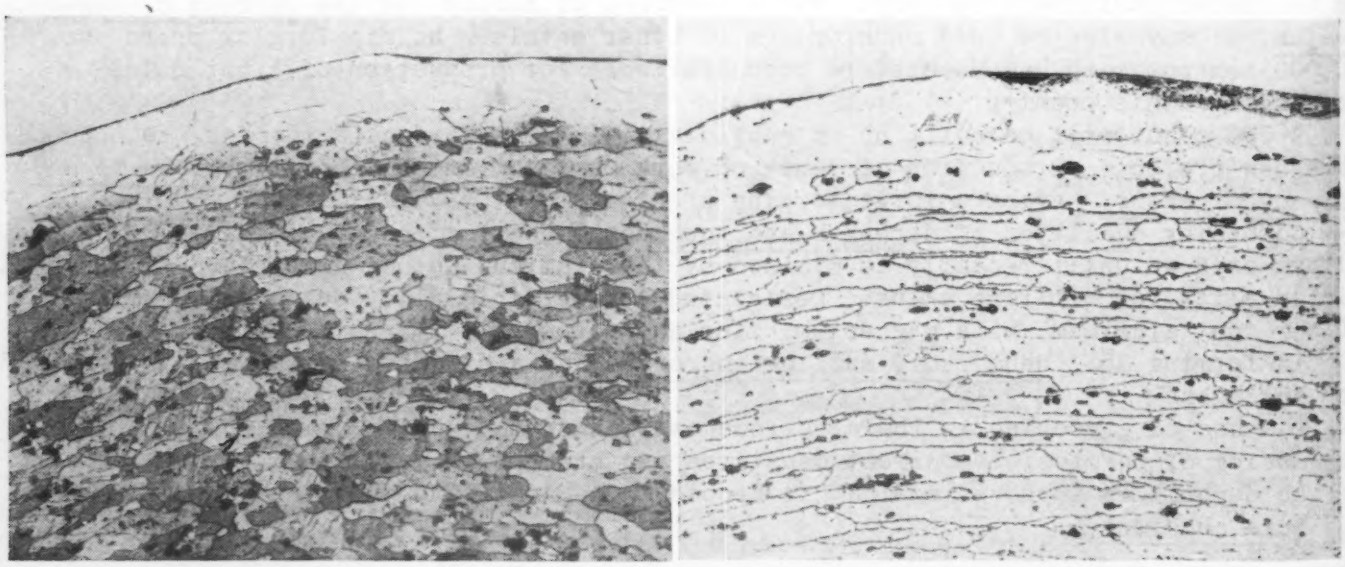
However, it was possible to establish the following minimum bend radii for straight 90 deg. flanges in Alclad 75S-T which would assure no more than 4 per cent rejections:

Gage, In.	Radius, In.	Ratio — Radius/Thickness
0.025	3/32	3.8
0.040	1/4	6.3
0.051	5/16	6.1
0.064	3/8	5.9
0.072	3/8	5.2
0.081	7/16	5.4
0.091	9/16	6.2
0.120	5/8	6.1

It was also possible to establish the following table of dimensions for joggles in Alclad 75S-T which would be free of cracks or severe strains:

Gage In.	Joggle Depth	Joggle Length	Forming Equipment
0.040	0.051	3/16	rolls
0.051	0.064	7/32	rolls
0.064	0.072	1/4	rolls
0.072	0.081	5/16	rolls
0.081	0.156	1/2	brake
0.091	0.102	1/2	brake

FIG. 1—A comparison of the micrographic structures of two Alclad aluminum alloys at the bend radius of dimpled 0.051 in. sheet, 200 diameters magnification after Keller's etch. Left, in Alclad 24S-T, there is satisfactory grain orientation, complete recrystallization and average constituent size, suitable for average forming requirements. Right, in Alclad 75S-T, grains are elongated and sensitive to shear failure, and there is considerable residual strain from rolling. This structure is not suitable for average forming operations.



New Aluminum Alloy-Alclad 75S-T

By A. A. BIBEE
Process Metallurgist,
Douglas Aircraft Co., El Segundo, Cal.

A new Alclad alloy for airframe skins developed by the Aluminum Co. of America has a combination of strength and toughness superior to any of the aluminum alloys used up until recently by the aviation industry. The alloy, designated as 75S, contains approximately 90 per cent aluminum, with magnesium, zinc and copper. In its heat treated condition, it is in general less readily fabricated than Alclad 24S-T, the principal aircraft skin material now in use. In forming, bend radii must be increased, and a different allowance is required for springback. The results of an investigation into modification of dimpling procedure for flush riveting are presented in the accompanying article.

Accelerated corrosion tests have indicated that Alclad 75S-T resists corrosion as well as Alclad 24S-T. However the former is more affected by slower quenching rates and diffusion, particularly in the thinner gages. Stress corrosion cracking of Alclad 75S-T is not likely because of the electrolytic protection afforded by the cladding. None has been observed to date after a year's seacoast exposure of highly stressed, plastically deformed samples.

Comparative typical properties of Alclad 75S-T and 24S-T are as follows:

	Alclad	
	75S-T	24S-T
Tensile strength, lb. per sq. in.	77,000	64,000
Yield strength, lb. per sq. in.	67,000	43,000
Elongation in 2 in., per cent	11	18
Shear strength, lb. per sq. in.	46,000	40,000

A comparison of guaranteed minimum properties for the aluminum alloys 24S-T and 75S-T indicates that by modification of the heat treatment of the former alloy, strength values approaching that of the latter may be obtained, but only at the expense of ductility:

Alloy	Tensile Strength Lb. Per Sq. In.	Yield Strength Lb. Per Sq. In.	Elongation Per Cent in 2 In.
24S-T	56 to 60,000	37 to 38,000	10 to 13
24S-RT	62 to 66,000	48 to 50,000	8 to 10
24S-T81	62 to 64,000	54 to 56,000	5.0
24S-T86	66 to 68,000	62 to 65,000	3.0
75S-T	72,000	62,000	8.0

Dimpling Study

The first step in studying the dimpling characteristics of Alclad 75S-T sheets was to make tensile tests of all sheets to be used. The averaged results of the tests can be seen in Table I, and it will be noted that the strength and toughness of this material greatly exceed comparable properties of Alclad 24S-T.

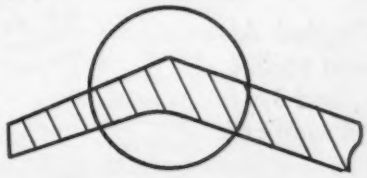
All dimpling was done with Douglas standard 100 deg. male dies. The female dies used with them were unused Douglas standard dies having an included angle of 110 deg. and worn dies currently in use in the shop. In the latter instance it was hoped to establish a range of tolerances for female dies. As can be observed from the photomicrographs shown in Figs. 3 to 5, dimples produced with used dies were quite unsatisfactory. Good definition could not be obtained except at the expense of severe circumferential cracking at the dimpled hole and cupping of the sheet.

Cracks and internal strains were developed in dimpling with new female dies conforming to Douglas standard dimensions. "Canning" or cupping of the sheet made it impossible to produce a flat panel. The quality of the dimples was poor and unacceptable for use. Where large constituents accompanied by a stringer type of defect were observed in the microstructure of the dimpling areas of the sheet, severe cracking occurred usually parallel to the direction of rolling and following the stringer defect. However, shearing occurred in the more defective areas. The radial cracking in the dimples produced with standard dies was severe and could be readily seen. However, circumferential fracturing on the radius of the dimple was not always transmitted to the cladding and, for the purpose of the investigation, microscopic examination of the dimpled areas was required.

Experimental female dies incorporating a series of modifications of the included angle, diameter and radius were developed to determine whether the dimpling defects could be relieved by variation of any of the three dimensions from standard, or moved to less critical areas. Larger radius dies produced dimples with poor definition and resulted in cupping of the sheet, which rendered them unsuitable for use in dimpling for flush riveting, particularly in the smaller rivet sizes.

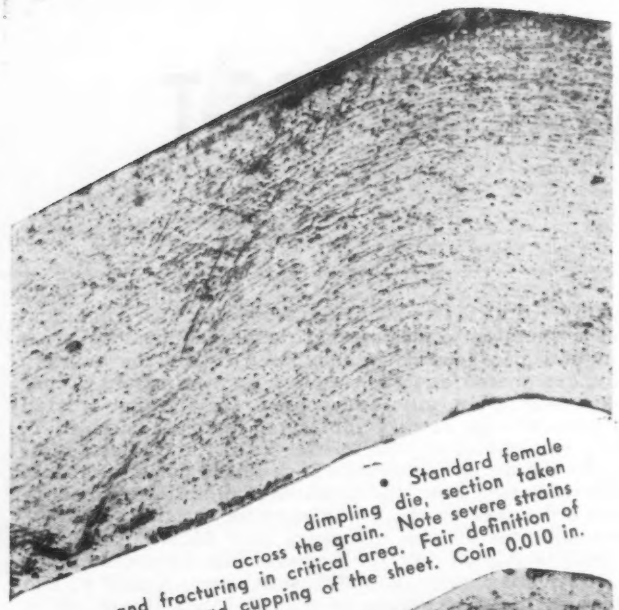
Dies in which the included angle is increased from the standard 110 deg. to 112 deg. produced satisfactory dimples. Internal strains were minimized and were removed to the lowest extremity of the dimple. Cracking was avoided in most gages. Definition was good, and cupping, warping or canning in the sheet was negligible.

FIG. 2—Position at bend radius on dimpled sheet where all photomicrographs in dimpling study were taken.

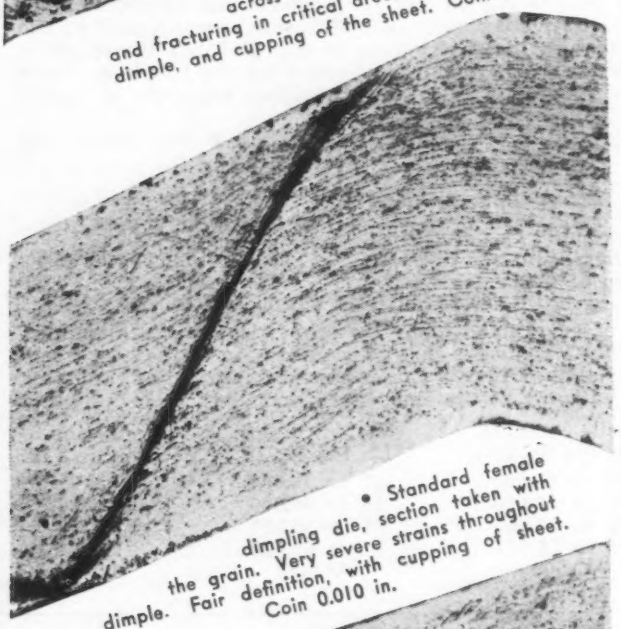


The metallurgical phases of the investigation were concerned with the microstructural quality of the Alclad sheet, examination for dimple defects, and to guide the development of proper tooling. The development of proper die design was facilitated by comparing changes in the microstructure at the dimpled areas as die design was modified. It was also possible to observe the movement of areas containing defects and strains and, by modification of die design, to direct their movement to less critical positions.

Measurements were made of the thickness of the core material at the base of the dimple in sections taken

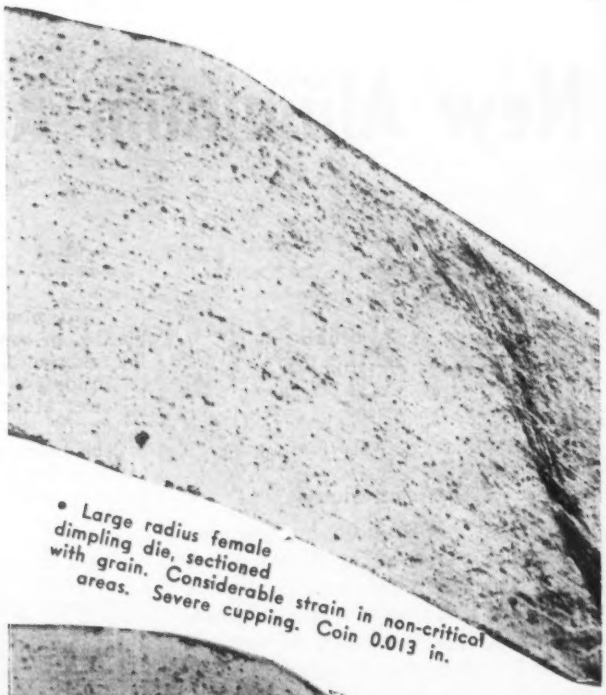


• Standard female dimpling die, section taken across the grain. Note severe strains and fracturing in critical area. Fair definition of dimple, and cupping of the sheet. Coin 0.010 in.

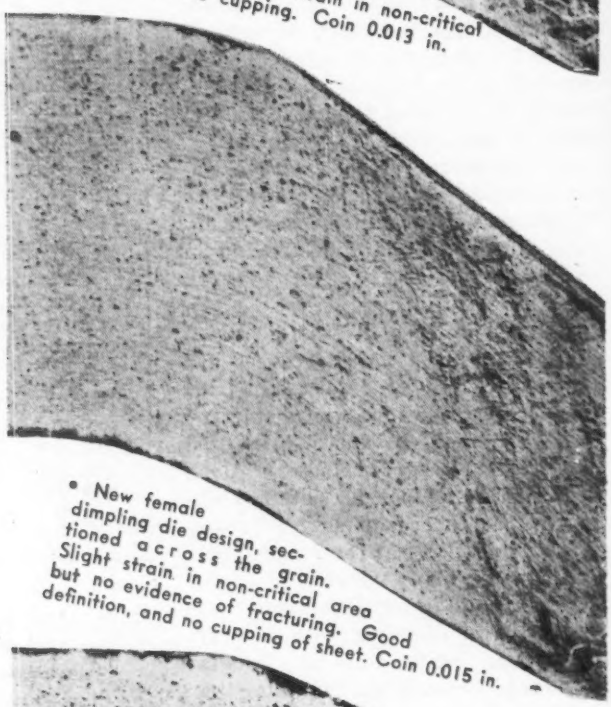


• Standard female dimpling die, section taken with the grain. Very severe strains throughout dimple. Fair definition, with cupping of sheet. Coin 0.010 in.

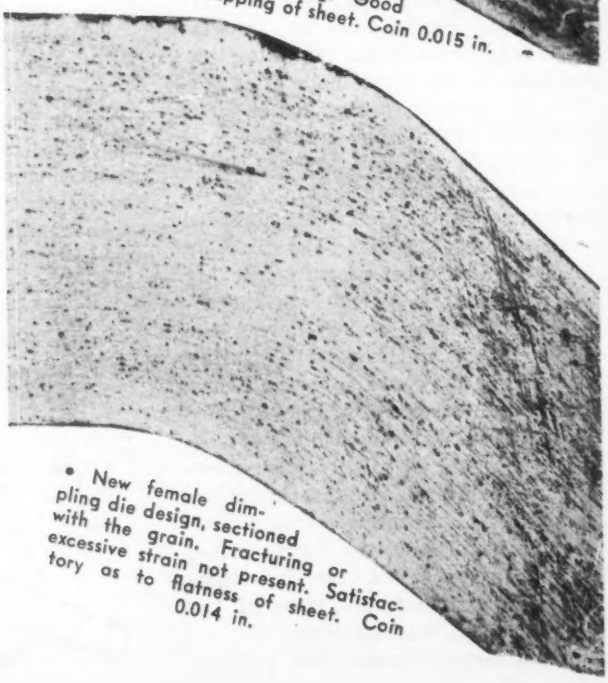
• Large radius female dimpling die, sectioned across the grain. Excessive strains, very poor definition and considerable cupping. Coin 0.013 in.



• Large radius female dimpling die, sectioned with grain. Considerable strain in non-critical areas. Severe cupping. Coin 0.013 in.



• New female dimpling die design, sectioned across the grain. Slight strain in non-critical area but no evidence of fracturing. Good definition, and no cupping of sheet. Coin 0.015 in.



• New female dimpling die design, sectioned with the grain. Fracturing or excessive strain not present. Satisfactory as to flatness of sheet. Coin 0.014 in.

FIG. 3 — Photomicrographs of dimpled Alclad 75S-T sheet taken at the bend radius. These specimens were 0.051 in. thick, and 3/16 in. dies were used for dimpling. Magnification 35X.

FIG. 4—Photomicrographs of dimpled Alclad 75S-T sheet taken at the bend radius. These specimens were 0.064 in. thick, and 3/16 in. dies were used for dimpling. Magnification 35X.

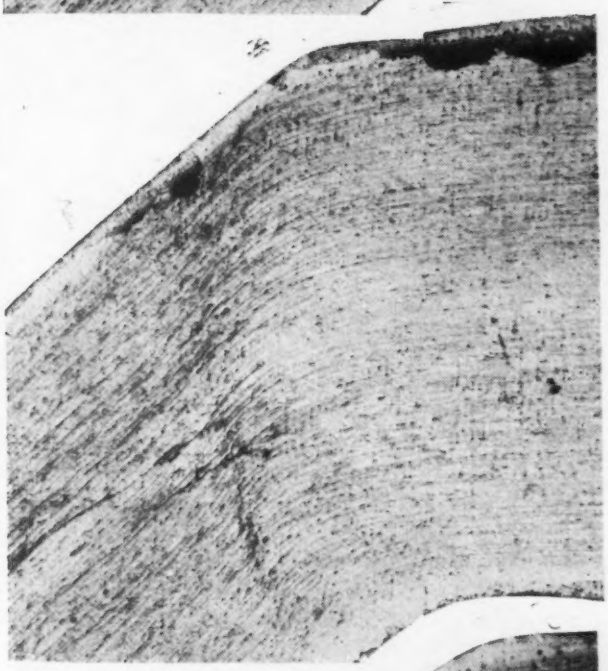
o o o

LEFT

• Standard female dimpling die, section taken across the grain. There is a slight fracture on the outer bend radius and some strain in critical bend areas. There are stringer defects in the center of the sheet. This gage exhibits extreme elongation of the grains and residual stresses from rolling. Fair definition of dimple, and cupping of sheet. Coin 0.016 in.

ABOVE

• Large radius female dimpling die, sectioned with the grain. Less strain than across grain section. Slight longitudinal slip and rolling stresses present. Poor definition and cupping of sheet. Coin 0.019 in.



o o o

LEFT

• Standard female dimpling die, sectioned with the grain. Two stringer defects in center of sheet. Slight strain. Structure unsuited to moderate forming. Fair definition and cupping of sheet. Coin 0.015 in.

o o o

ABOVE

• New female dimpling die design, sectioned across the grain. Material defects, rolling stresses, and slight strain near critical bend area. Good definition and flatness. Coin 0.019 in.

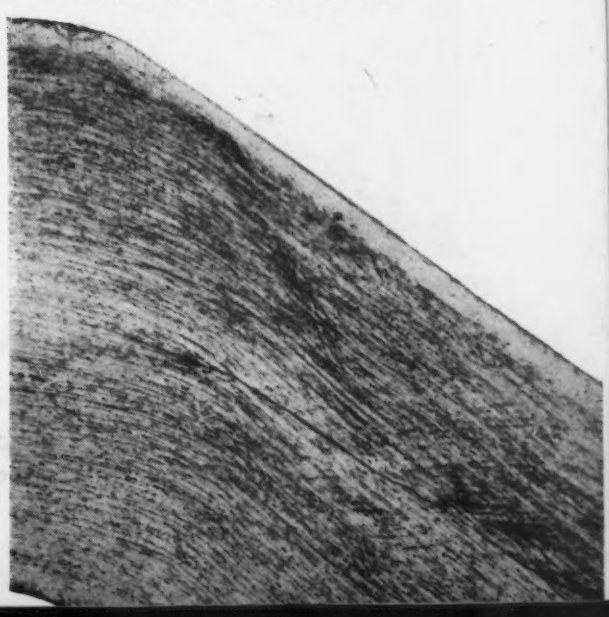
LEFT

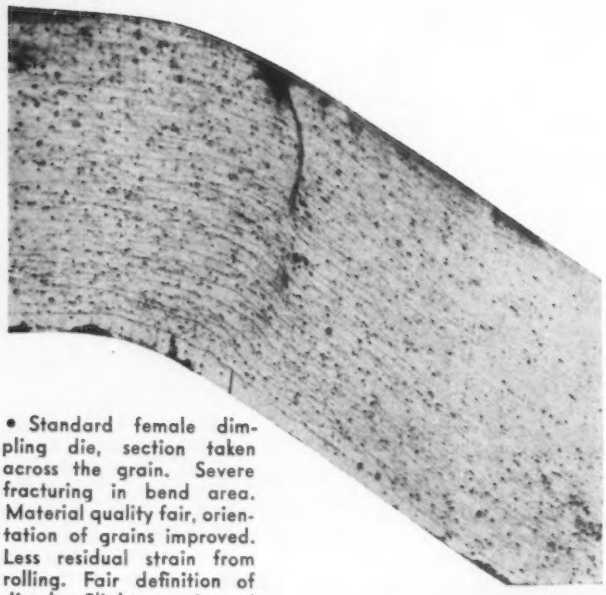
• Large radius female dimpling die, sectioned across the grain. Considerable strain in less critical areas. Core defects and rolling stresses, but no fracturing. Poor definition, and severe cupping. Coin 0.021 in.

o o o

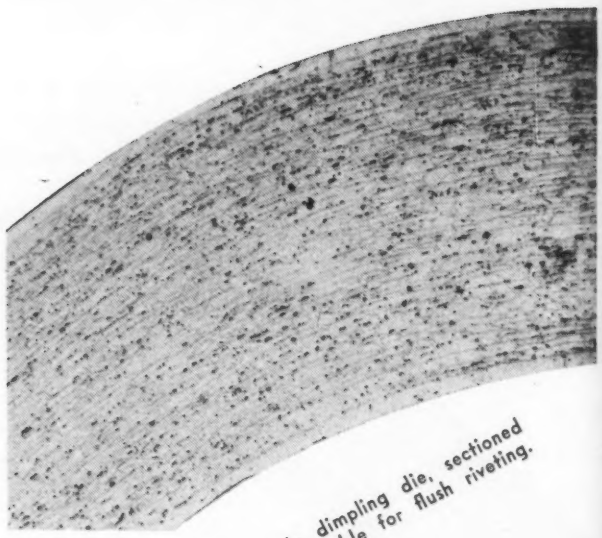
RIGHT

• New female dimpling die design, sectioned with the grain. Longitudinal slip in center of sheet and slight transverse strain. Good definition and overall flatness of sheet. Coin 0.018 in.

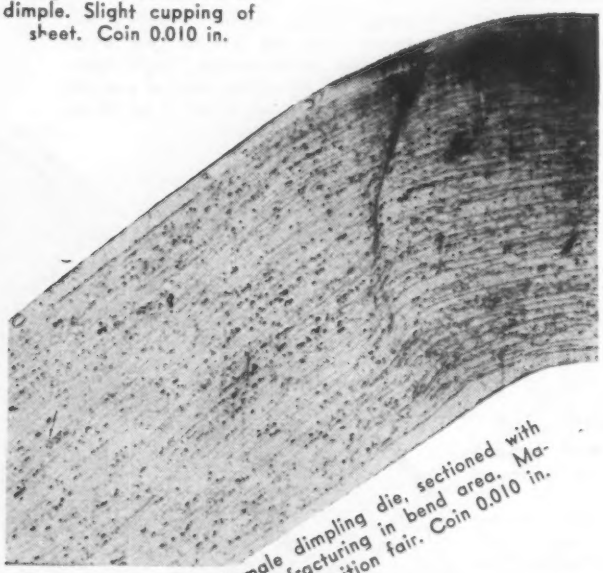




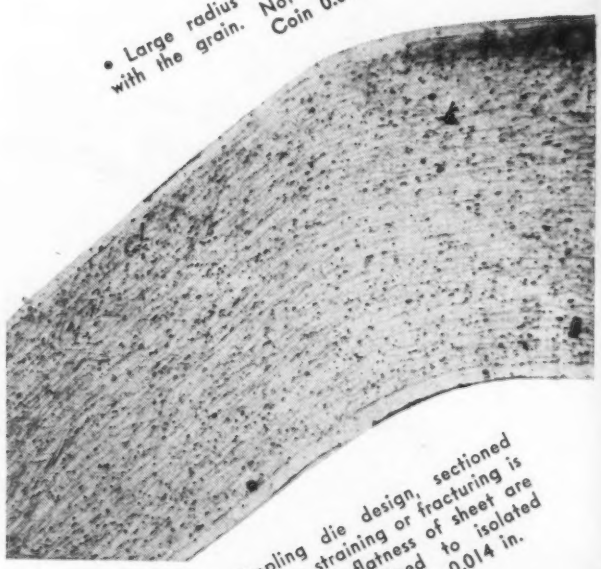
• Standard female dimpling die, section taken across the grain. Severe fracturing in bend area. Material quality fair, orientation of grains improved. Less residual strain from rolling. Fair definition of dimple. Slight cupping of sheet. Coin 0.010 in.



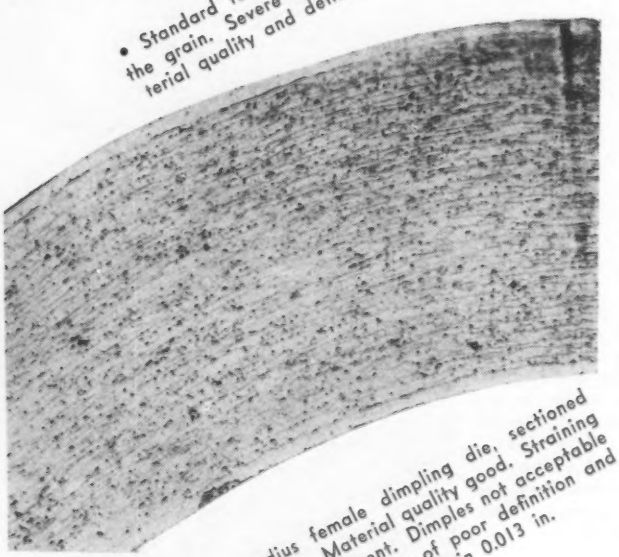
• Large radius female dimpling die, sectioned with the grain. Not suitable for flush riveting. Coin 0.012 in.



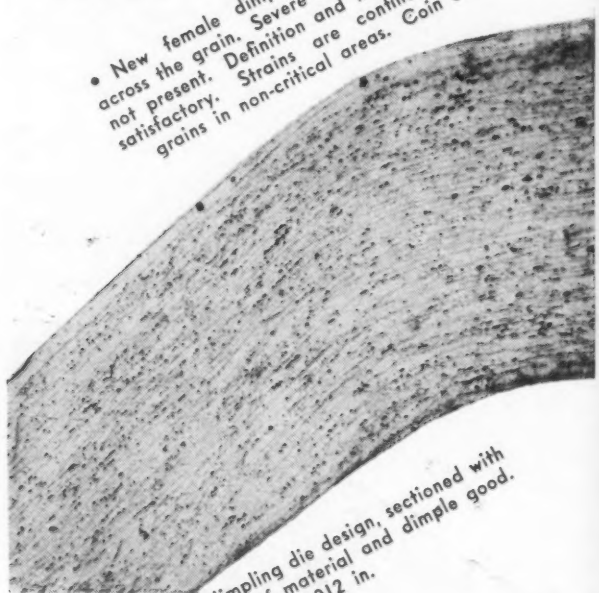
• Standard female dimpling die, sectioned with the grain. Severe fracturing in bend area. Material quality and definition fair. Coin 0.010 in.



• New female dimpling die design, sectioned across the grain. Severe straining or fracturing is not present. Definition and flatness of sheet are satisfactory. Strains are confined to isolated grains in non-critical areas. Coin 0.014 in.



• Large radius female dimpling die, sectioned across the grain. Material quality good. Straining or fracturing not present. Dimples not acceptable for flush riveting because of poor definition and cupping of sheet. Coin 0.013 in.



• New female dimpling die design, sectioned with the grain. Quality of material and dimple good. Coin 0.012 in.

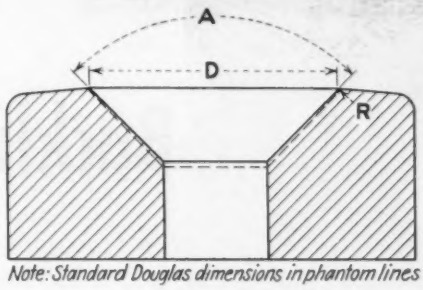
FIG. 5—Photomicrographs of dimpled Alclad 75S-T sheet taken at the bend radius. These specimens were 0.040 in. thick, and 5/32 in. dies were used for dimpling. Magnification 35X.

across the grain and with the grain. In most specimens, coining or compression of the sheet was more drastic in sections taken with the grain than in those across the grain. The amount of strain was also appreciably greater. It was found, moreover, that by controlling the degree of coining by opening the included die angle, it was possible to permit the diameter of the die to be enlarged sufficiently at the bend or radius to provide proper definition and flatness of the sheet when using relatively low riveting machine pressure. The satisfactory female die design is shown in Fig. 6. The machine employed was a Chicago Pneumatic No. 219 pedestal type riveter. With ram pressure at 75 lb. minimum, the following gun pressures are recommended for various gages of Alclad 75S-T using several common sizes of rivet:

Rivet Size In.	Riveting Gun Pressure, In Lb.			
	0.032 in.	0.040 in.	0.051 in.	0.064 in.
1/8	19	23	30	40
5/32	30	38	48	64
3/16	40	56	68	90

Conclusions

Improvements will undoubtedly be made by the manufacturer of Alclad 75S-T in regard to grain size, orientation of grains and annealing practices which should serve to improve its uniformity and response to fabricating methods. Nevertheless, riveting dimples formed in accordance with the following gage limitations and female die design are acceptable for use and may be considered free from excessive strains or fractures:



Note: Standard Douglas dimensions in phantom lines

FIG. 6 — Douglas designed female dimpling die for Alclad 75S-T. Phantom lines indicate the dimensions of the Douglas standard dimpling die used for Alclad 24S-T.

Rivet	Limited to Gages of Alclad 75S-T, In.		
AN426-4F	0.025	0.032	0.040
AN426-5F	0.032	0.040	0.051
AN426-6F	0.040	0.051	0.064

The Comparator method is recommended for inspection of all female dies. By a precision check of their dimensions, rejections will be minimized and production man hours saved. Accuracy of female die dimensions in accordance with the new design very largely determines the quality of the dimples in Alclad 75S-T and will serve to prevent rupturing. Inspection personnel should be adequately informed of the necessity for careful inspection of all dimpled assemblies of Alclad 75S-T sheet as circumferential cracks may be very easily overlooked.

Fatigue tests show that Alclad 75S-T dimpled and riveted panels compare favorably with the conventional Alclad 24S-T fabricated with standard dimpling sets.

While success has been reported in hot dimpling of this Alclad sheet, it was considered that there would be difficulty in establishing the critically controlled procedures required for thermal treatments. Less difficulty is anticipated with the modified tooling recommended. It is reasonable to assume that the modified female dies could also be used satisfactorily for dimpling Alclad 24S-T, so that duplicate dimpling tools need not be stocked at all riveting machines.

Female Dimpling Die Dimensions			
Die Size In.	Diameter In.	Included Angle Deg.	Bend Radius In.
1/8	0.253	112	0.009
5/32	0.321	112	0.015
3/16	0.387	112	0.045

The author wishes to acknowledge the assistance given by R. E. Newton, riveting consultant, and L. P. LeBarge, riveting specialists Douglas Aircraft Co., in carrying out the tests and in accumulating test data.

Carbon Flue Dispersal of Corrosive Gases

AMPLIFYING the more widely known uses of carbon and graphite deriving from their chemical resistance to the action of practically all corrosive fluids, a unique application of carbon for controlling corrosive and explosive gases has been developed and installed in the new laboratories of the St. Lawrence Alloys & Metals, Ltd., Beauharnois, Que.

Construction of the new laboratory required that gases from furnaces and testing tables in the basement be dissipated through a brick chimney running up through the center of the building. To overcome the corrosive action of the gases on ordinary chimney brick and to avoid an explosion hazard if the gases were indiscriminately released, two 8 in. i.d. flues of corrosion resistant carbon pipe were built into the chimney to carry two groups of gases and protect the brickwork. Use of two flues kept separate those gases that might produce an explosion if permitted to mix. Metal hoods mounted over the testing tables and furnaces and connected to the horizontal carbon tubes carried ammonia, hydrochloric acid, ether and ethyl acetate gases into the No. 1 flue. Hydrofluoric, sulfuric, nitric, perchloric acid gases and chlorine fumes were directed into the No. 2 flue.

The gases are exhausted through the flues by mechanical means. To minimize condensation and a liquid backdrip of acid solutions that might be caused by rain or snowfall in the flue openings, roofed chambers with side outlets were built of carbon brick. The bottom of each flue consists of a slanted carbon disk covered with a built-up layer of carbon cement. Any acid solutions formed will flow out through a small carbon pipe spillway when a carbon dripcock is opened.

Each of the 31 ft. carbon flues is formed of threaded lengths of carbon pipe. Joints are sealed with a carbonaceous cement with the female threads in the upward position, thus providing an added protection against seepage. According to reports released by St. Lawrence Alloys & Metals, Ltd., the exhaust system is highly efficient, and the gas fumes originating in the laboratory are undetectable on the floors above.

Buckling Prevented

. . . On large work, controlled expansion in special jigs which hold the work flexibly is being used in place of preheating, still retained on small work.

FIG. 1—These ducts still retain the flat base after welding has been done in a jig with the controlled expansion feature. The inventor of the system, Arthur H. Brown, is shown checking a duct on a surface plate.

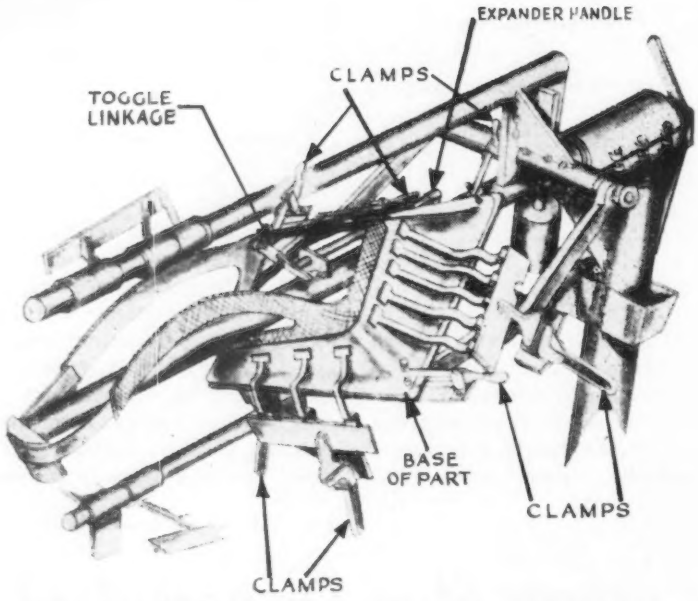


FIG. 2—The trunnion jig used to retain the upper and lower parts of the duct is provided with individually springed fingers which exert an adjustable external pressure on the surfaces of parts being welded permitting movement of the expanded metal in a definite plane. Note the webbing which supports the upper half of the part, not shown.

A MECHANICAL procedure in place of preheating for the control of the buckling commonly encountered in welding sheet aluminum has been developed at the Vultee Field Division of Consolidated Vultee Aircraft Corp., Calif.

It has been long known that buckling can be prevented by preheating aluminum parts to a temperature of more than 950 deg. F. However, it has been found impractical to keep large sheet metal assemblies preheated in the course of a lengthy torch welding job. Arthur H. Brown, employed at Vultee on special assignments, has designed devices which substitute for the preheating process by relieving the stresses set up in local heating and expansion.

The basis of Brown's procedure can be illustrated by a simple welding experiment. A circle of sheet aluminum placed on a fire brick has a torch applied to the center. The heated area expands, but the periphery remains constant. The expansion forces a flow of metal out along the plane of the material, which is resisted by an unyielding cold peripheral portion. Hence, the metal is forced to take up the difference in expansion by arching. Now, if a new circle of aluminum is taken and a cut made from the edge to the center it will be noticed that most of the expansion has been relieved by the cut, which opens and allows the periphery to expand, thus accomodating the centrifugal flow of expanding material.

This expansion characteristic is taken advantage of in butt welding by laying the butt weld seams open at one end and welding from the closed end. The weld bead, that is, the expanded area, travels down the seam and upon cooling it remains in tension. Accordingly, the metal flow is inward and the V-gap is progressively closed. The gap should be preset open approximately ⅛ in. per linear ft. weld in order to close the seam without causing an overlap condition.

In Fig. 1 are shown ducts, designed to be bolted to the leader plate of an intercooler, for which a buckling control procedure utilizing the principle outlines above has been successfully adopted. The base of the duct must be perfectly square and flat, a condition which previously was obtained by hand working, sometimes as much as an hour per unit. In some in-

in Welding Aluminum Sheet . . .

stances it was also necessary to relieve a corner with a sawcut and fishmouth patch.

Balanced Pressures

Handworking is practically eliminated by using the ball bearing trunnion jig, shown in Fig. 2. The construction of the jig is such that in making a butt weld joggling is avoided by permitting the heated parts to slip in the plane passing through the edges. In place of the conventional rigid clamp, a set of individually springed fingers acuated by a single clamping handle exert an adjustable pressure on the surfaces of the parts being welded. Against the external pressure of the fingers is an internal expanding box structure, the pressure of which is adjusted by the expander handle. By employing a webbing or screen in place of a solid backing plate, heat is more likely to be retained in the aluminum instead of being lost by conduction to the jig frame.

The method of leaving V-gaps before commencing to close seams by welding is illustrated in Fig. 3. As may be noted a gap (about 3/16 in.) has been set at (A), the meeting point of the two seams one of which is shown already welded. Welding is started at the crown where the seam is practically closed and finished at (A). Sometimes a gap will remain which can be handled by adjusting the webbing so as to attain the desired abutment of edges and making tacks.

With this setup it has been possible to turn out an average of 68 ducts daily with only minor straightening operations following the welding. It has been the experience at Vultee that although new welders have been placed on this work at frequent intervals, it has not been necessary to permanently reject a single unit during the past year.

Where small parts are involved it is still practical to preheat the pieces prior to welding. Controlled expansion can be used here also. Fig. 4 shows a welding jig fixed in a table type positioner in which a thick block of steel (insulated from the turntable by an asbestos pad) is brought up to a temperature of about 1000 deg. F. prior to welding. On top, the block is contoured to the shape of the flange plate which is to be welded to a piece of aluminum tubing, the plate being held on the block by means of a clamp and tooling pin. The heat of the block, maintained throughout the process by the welding torch, preheats the aluminum plate which, being held at the top and bottom, is free to expand sidewise. The tube belonging to this assembly is located by a round gate on the end of an internal brace at the top and by a screen core at the bottom.

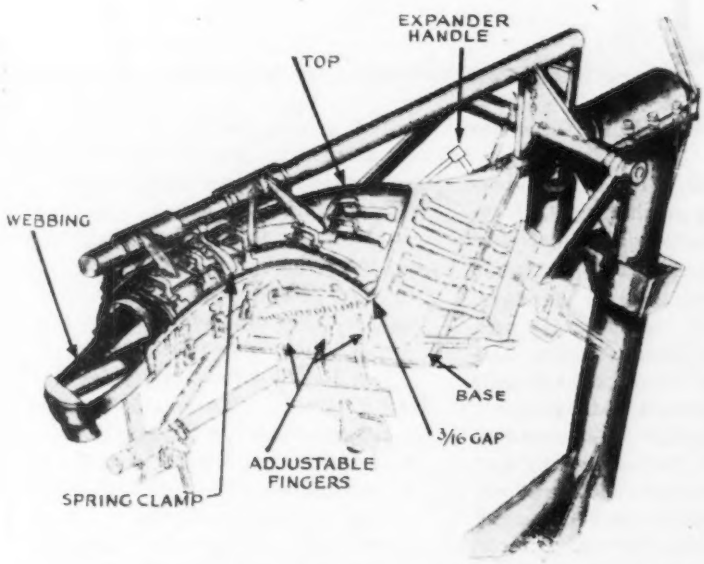


FIG. 3—To overcome arching or buckling in the aluminum due to the difference in expansion of a heated area and a surrounding cold area of metal, a V-gap is preset at (A) before commencing to weld the seams. The expander handle controls an internal structure which exerts pressure against the outside fingers in order to obtain desired abutment of the edges.

o o o

FIG. 4—Preheating prior to welding, economical for small parts, is being accomplished on welding jig shown fixed on positioner with turntable. Heat from the thick steel block, maintained by the welding torch, is absorbed by the aluminum plate. Controlled expansion of the tube is permitted.

QUESTIONNAIRE ON SUPERVISORY JOB SPECIFICATIONS

TO OUR FOREMEN:

We are preparing job descriptions of supervisory positions. You can help us obtain a clear-cut breakdown of your own duties and responsibilities by filling out this questionnaire. Before putting the specifications into effect, we will of course, go over the material with you point by point.

Name: _____

Department: _____

Division: _____

Position Held: _____

Name of Your Supervisor: _____

His Title: _____

I. *AUTHORITY*

a. Who gives you your orders and instructions?

_____

b. How do you receive your orders?

Verbally ☐

In Writing ☐

c. Do any other persons or departments give you orders and instructions? Name specific persons and departments:

_____

_____

_____

d. What kind of orders and instructions do you get from each of the above?

_____

_____

_____

e. How often?

_____

Analyzing The Foreman's Job

. . . Relatively few companies have applied the techniques of job evaluation to supervisory positions, according to a recently completed survey. A typical supervisory job specification is outlined herein.

o o o

By O. C. COOL
Director, Labor Relations Institute, New York

o o o

WHEN a survey reveals that fewer than 40 per cent of the supervisors have full understanding of their duties and responsibilities, it is easy to see why so many foremen feel uncertain about their business futures. Such a survey has just been completed by the field staff of the Labor Relations Institute, 1776 Broadway, New York 19, whereas, employers, have spent large sums of money over a long period of years on job specifications for production workers, 62 per cent of all foremen questioned have no "blueprint" to govern their jobs. Wherever such analyses of foreman jobs and duties have been made, each supervisor knows exactly where his authority begins and ends. That, in turn, serves to correct one of the most serious obstacles to better labor relations all along the line.

Here is a typical job specification prepared by the Institute's management engineering division:

POSITION: Foreman, milling department
PLANT: Cleveland
DIVISION: Compressor; turbo-generator
DEPARTMENT: Milling machine
PERSONAL CODE: ADC963Z
DATE ESTABLISHED: December 22, 1942
SIMILAR JOB TITLES: Supervisor, milling machine dept.; foreman, small parts milling machines

I. Line of Authority—Accepts direct supervision from division manager. Correlates and collaborates with planning department (tools and methods), time study department, production control department, plant engineering department, safety engineer, recruiting and employment division and industrial relations department, cost department and inspection department. Directs and supervises subordinates such as assistant foreman, group leaders, operators, shop stewards, etc.

II. Responsibilities A. Management: Gets out maximum production at quality standards and at minimum cost. Responsible for departmental production performance; has full departmental authority.

B. Subordinates: Direct supervision of 1 assistant foreman, 4 setup men, 7 group leaders, 3 departmental clerks, 50 to 75 milling machine operators and 15 to 20 apprentices or trainees.

C. Standards of performance, quantity and quality: Maintenance of quality standards as shown on prints. Responsible for specifications during process and on completion.

D. Maintenance of production schedules:
1. Manhours
2. Machine operation
3. Good housekeeping
4. Enforces safety.

III. Personal Characteristics Required:

A. Education: High school or equivalent, with technical training desirable. Ability to read complex blueprints required; should have thorough basic understanding and working ability in mathematics, such as arithmetic and algebra.

B. Experience and background:
1. Ability as all around production man required, either acquired by apprenticeship training or in actually doing the work. (This in order that he may correlate and function with and understand other departmental requirements).
2. Actual experience of at least two years as production group leader (lead-man or assistant foreman).

II. *JOB DETAILS*

a. What are your:

Daily Duties—(list completely)	% of time spent
Weekly Duties	
Monthly Duties	
Miscellaneous	

b. Write out the names and jobs of the people who work directly under you:

Name	Job Duties

c. What standards do you use to check

1. Quality .....
2. Quantity .....
3. Employee efficiency .....

d. Give a brief description of the physical working conditions in your department, such as long hours, heat, noise, vibration, etc..

e. What technical qualifications are necessary to run your department?

f. What educational background is needed?

g. What other qualities do you think are important?

3. Should have working knowledge of production methods, machine setup, intra-department production scheduling, department equipment and machine layout. Knowledge of characteristics of various metals and alloys machined.
4. Must have completed in-plant training courses in
   a. Job instruction training
   b. Job methods and work simplification
   c. Safety policies and methods
   d. Supervisory and executive training in labor relations, policies and methods.

C. Physical Characteristics:
   1. Good health required to assure regular attendance and to provide ability to withstand overtime and rush production demands.
   2. Should have mature judgment to secure confidence of subordinates.

D. Personal Contact Requirements:
   1. No public contacts required.
   2. Must be approachable by employees and have ability to discuss grievances with employees and union shop stewards. Must render decisions and secure acceptance by employees.
   3. Must have ability to instruct in methods and techniques and secure employee acceptance when changes are desirable.
   4. Must rate employees fairly for merit, either for increased pay or for reclassification or promotion. Must have ability to discuss ratings with the employees, secure their acceptance and cooperation and suggest means for improvement.
   5. Must capably represent the interests of the department employees to management, and secure acceptance.
   6. Must be able to present and discuss problems of coordination of work of his department with other departments, both "line" and "staff," and by tactful presentation secure acceptance and cooperation; must capably represent the interests of his department in supervisory meetings.
   7. Must be able to analyze the operational problems of his department and present factual evidence as a basis for discussion of such problems with the plant manager and other top executives, and secure acceptance.

E. Ability to analyze production costs, inspection reports and production scheduling. Reports for (1) work in process, and (2) completed units, etc.

Job Analysis Suggestions

Preparing job specifications of this sort is something that almost every personnel department is equipped to do. It is advisable to have such work done under the close supervision of a company executive who has an operating knowledge of the plant. The foremen themselves can be of great assistance in analyzing their respective duties through the use of a questionnaire like the one reproduced herewith and participation in this work will give them an added sense of

(CONTINUED ON PAGE 57)

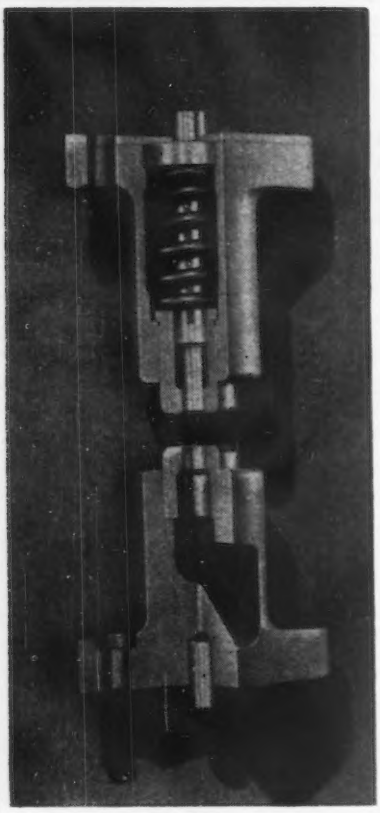


FIG. 1 — Quarter-section view of Wales type "CD" unit showing the relationship of components of the self-contained punch assembly and die assembly.

o o o

Multiple Hole Punching Die Quickly Assembled

o o o

FREQUENCY of design changes, notably of aircraft sheet metal parts, makes it highly desirable to use a quick assembly type hole punching system. Such a system becomes valuable when it can lead to the release of experienced die makers and die setters and to the use in their place of any good mechanic who can put the assembled type die into operation often on the same day that a pattern is handed over for production.

* *See article, "Multiple Subpress Dies for Aircraft Fabrication,"* THE IRON AGE, *Aug. 27, 1942, p. 52.*

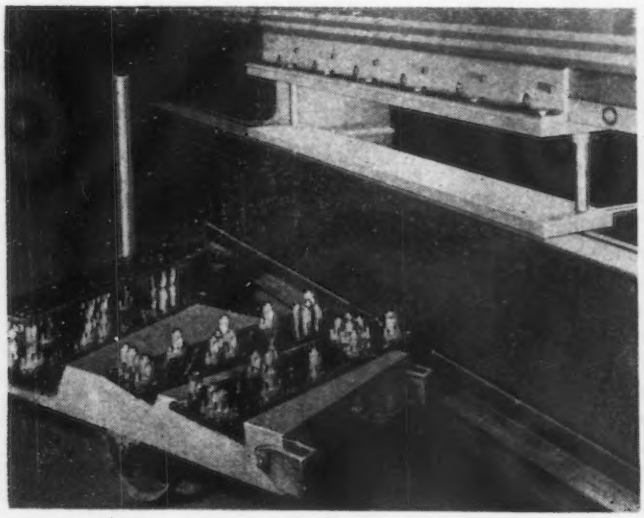
The new Wales "CD" hole punching system developed by the Wales-Strippit Corp., North Tonawanda, N. Y., utilizes a unit consisting of two parts, a punch assembly and a die assembly. These are independent and self-contained for quick mounting to templates and thence to die sets or direct to die sets for long runs. This unit differs from a prior unit* developed by this company in which the punch and die assemblies were combined in a single holder that could be attached to a T-slotted plate or a press brake rail.

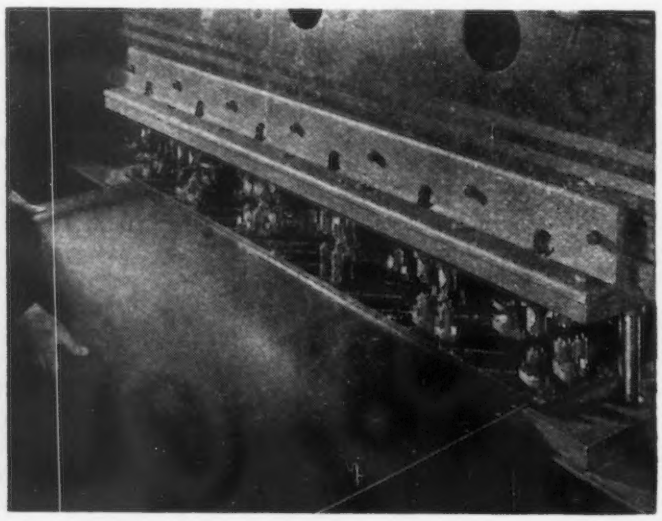
As illustrated in the cutaway view, Fig. 1, the punch assembly consists of a holder that retains the punch, stripping spring and guide in relationship to the separate die assembly which consists of a holder with a built-in slug clearance chute, a die and a pilot pin. The corresponding pilot pin in the punch assembly is part of the punch. All parts of these units are interchangeable and are easily removable for sharpening. Since the type "CD" units have a uniform shut height, only one adjustment of the press ram is required, regardless of the number of hole punching patterns.

Methods of Mounting

To form a multiple hole punching die, these units may be mounted to

FIG. 2—For template mounting a pair of templates is required, one for mounting the punch assemblies and one for mounting the die assemblies. At the left, template setups are ready to be mounted in the die set in press brake. At the right, Wales "CD" units are shown set up to punch straight line, staggered, scattered and individual group patterns.





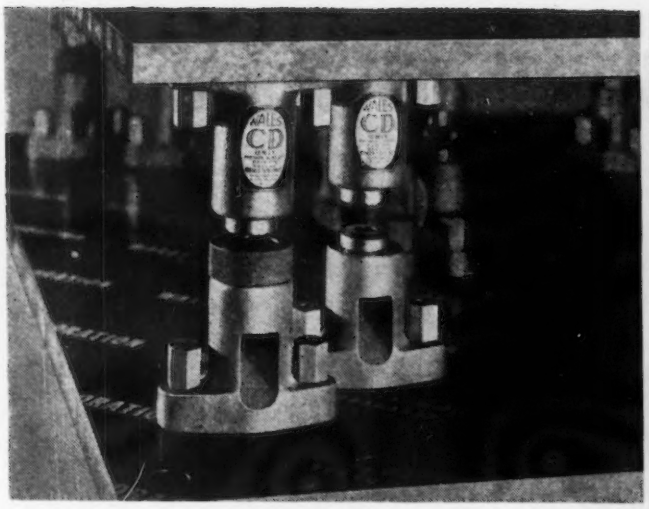


FIG. 3—In order to line up the punch setup with the die setup, locator rings are temporarily placed around the four corner die assemblies.

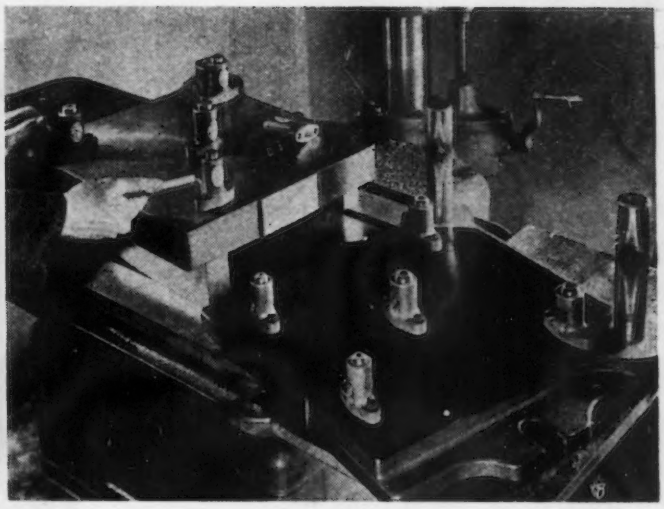


FIG. 4—Punch and die assemblies of the Wales "CD" units are being mounted direct to a die set, which is more economical for long runs.

templates or direct to die sets. In the case of template mounting, one template is required to accommodate all the punch assemblies and another for the die assemblies, Fig. 2. Among the advantages cited for these mounting templates are the ease of drilling pilot and mounting holes, transferring to and from the press and bolting to the die set.

The sequence of operations for mounting type "CD" units to the templates is first to clamp the templates together and lay out the hole pattern directly on the top template, or transfer the pattern from a master template. Holes 0.375 in. in diameter are drilled and reamed through both templates to accommodate pilot pins. Two mounting holes for both the punch and die assemblies are drilled and countersunk through both templates (0.302 in. diameter drill) locating both mounting holes with drill jig corresponding to holder size used. Standard 5/16—18 flat head machine screws with nuts are used to secure the punch and die assemblies to the templates.

Before the templates are bolted to the die set it is necessary to make sure of the alinement of punches and dies through the use of special parts called locator rings, Fig. 3. Usually four of these rings are sufficient, which are placed over the dies of the assemblies occupying approximately the four corners of the template. The coresponding corner punch guides on the upper template are fitted into the respective locator rings. Upper and lower templates are thus linked together in correct alinement and in this manner the templates are bolted to the die set. After the ram has been raised, the rings are removed and the die is ready for operation.

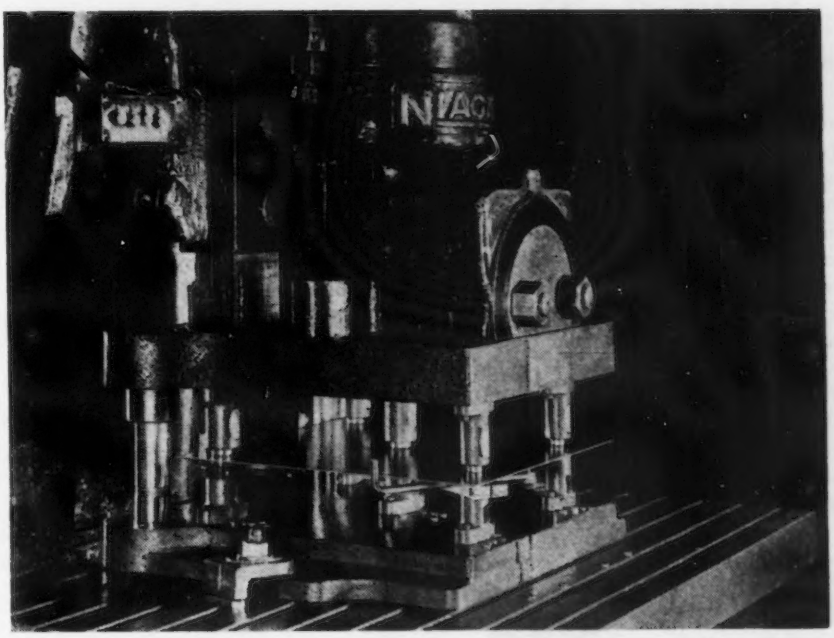


FIG. 5—Adjustable gage rods clamped to convenient die holders are an aid for accurate locating of the work in the die set.

For unusually long runs it has been found more economical to mount the "CD" units to the die set itself. The method previously described for mounting the units to the templates applies to the mounting onto die sets, Fig. 4. The drilling of two mounting holes and one pilot hole for each die assembly and punch assembly is required. Each pair of tapped mounting holes are located by drill jigs from the pilot pin hole.

For quick accurate locating of the work during feeding operations, work stops with adjustable gage rods are clamped to the die holder, Fig. 5. To eliminate sagging of the work, feed rails, made in 10, 20, 30, 40 and 50 in. lengths, are available for bolting to templates in the same manner as the die assemblies. They may be located wherever support is required by the work. Wales type "CD" units are available in four sizes—1⅛, 1⅜, 1¾, and 2⅜ in. holder widths to punch holes up to 1⅛ in. in diameter in materials up to ⅛ in. thick.

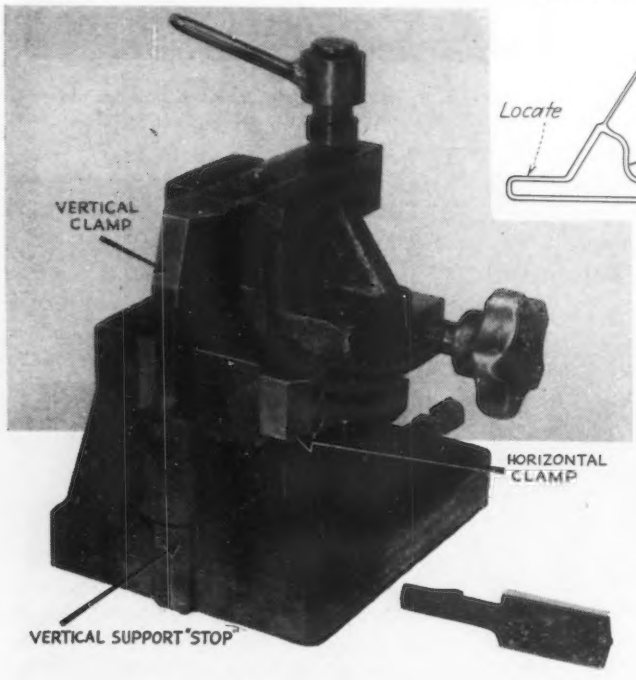
Broaching vs. Milling

By I. A. SWIDLO
Head Engineer,
Production Engineering Department,
Springfield Armory

FIG. 22—Rough forging and finished trigger housing for the Garand semi-automatic 0.30 cal. M1 rifle. In the machined form, this piece is a thin walled shell.

AS the name implies, the trigger housing of the Garand rifle houses the hammer and hammer releasing mechanisms, that is the trigger, sear and safety. This component appears to be of such a design that it would lend itself to milling and profiling methods of machining. As will be seen later, however, use of two duplex broaching machines has replaced 13 millers at a considerable saving in capital investment and direct labor. The forging is made of WD X1340 steel and weighs 1.6 lb., while the completed part is merely a shell with thin walls, weighing only 5 oz. The forging and finish component are shown in Fig. 22.

Except for intermittent milling operation to remove excess stock on inside of the plate, the first four cuts are broaching operations. Here again, due to the very irregular form and difficulties in holding the component rigidly enough, only a broach minded engineer would attempt to process this component by applying the broaching method. The first operation serves to establish locating surfaces for the several following cuts and later on these surfaces are removed entirely. This operation, known as Oper. 1, "broach edges to size and bedding surfaces", as shown in Fig. 23, is performed on a 5-ton, 54 in. Cincinnati duplex vertical broaching machine, with work holding fixture mounted on the left hand table and broach holder on the left hand side ram. The forging is located in the fixture at four spots, as indicated on Fig. 23, by "locate" and clamped horizontally against the left side at two points. The forging is also supported and clamped vertically against the point marked "stop." From the illustration it can be seen how the forging is held with two manually operated clamps against supporting blocks. In the same figure there is also shown a forging after this operation is completed.



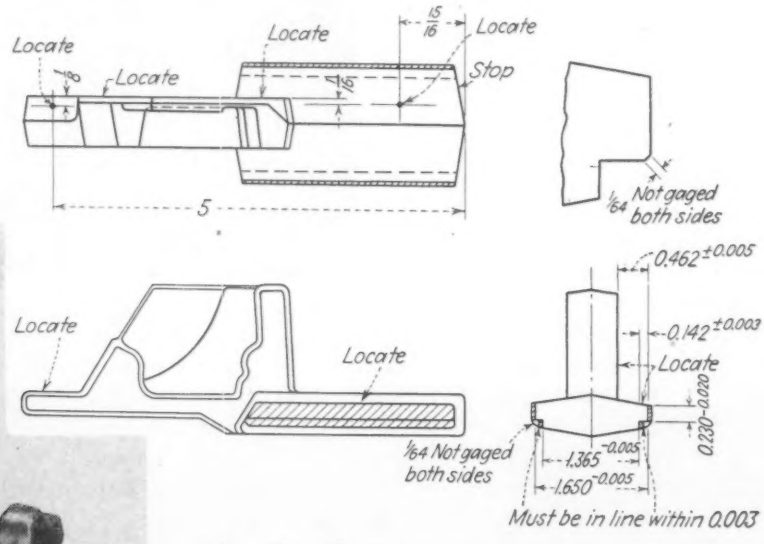


FIG. 23—Oper. 1 on the trigger housing consists of broaching the edges to size and the bedding surfaces. Hand clamped fixtures are used on all four broaching operations on this part.

Maximum stock removal of 0.125 in. requires a comparatively heavy chip load per tooth. In this case the first and second roughing broaches have

In Manufacturing Rifle Parts ▲ ▲ ▲

. . . As a third example of the application of broaching to components of the Garand rifle, Mr. Swidlo describes the broach tooling and fixture design for machining a part that is finally whittled down to a thin walled shell. In the fourth part of the article, he will analyze the tooling on a small, fragile part.

0.005 in. chip load per tooth, while the first tooth of the finishing broach removes a 0.003 chip, gradually decreasing to 0.001 in., with the last five teeth straight.

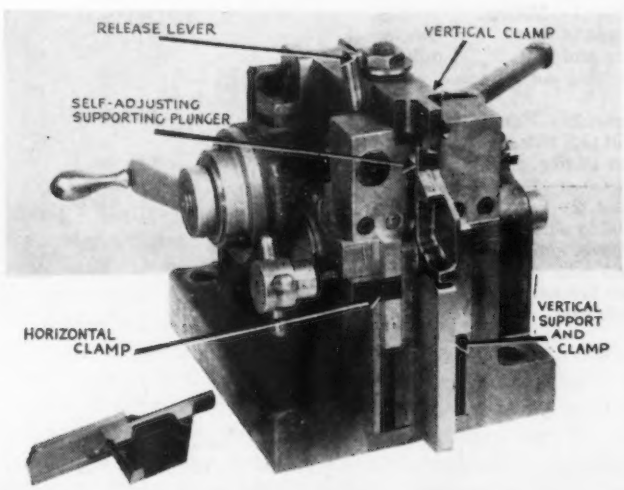
The next machining operation is milling, to remove excess stock from the middle portion of the front end, and has to be performed regardless of the methods used on the following cuts. After excess stock is removed the component goes back to the same broaching machine as for Oper. 1. On the right hand table of this machine is mounted a fixture to hold the component while Oper. 1A, "rough broach top and 80 deg. angle," is performed. This operation is illustrated in Fig. 24.

The forging is located in the fixture on the previously broached surface, resting vertically on top of the lower clamp shown in Fig. 24. Upon placing the forging into the fixture in this manner, by turning the knob seen at the left side, the operator forces the work by means of a horizontal clamp against one side previously broached. Since the dimensions produced by the first broaching operation are held within 0.005 in. it is necessary to work from the left side in order to avoid an accumulation of tolerances and be able to produce the component within the required limits. By turning the crank seen at the left in Fig. 24 the vertical supporting clamp draws the work against locating blocks, thus holding the work on surfaces broached on the preceding operation. The release lever actuates a cam in the fixture which permits a serrated self-adjusting supporting plunger to move forward under spring pressure until the rough forging is contacted. Cam construction inside the fixture is such that the plunger will not recede under pressure of the cut. The lever seen at the right actuates the vertical clamp forcing the work against the lower stop and self-adjusting serrated supporting plunger.

Since side broaching starts 9/16 in. from the bedding surfaces, provision is made on the four-section broach inserts to insure stock removal up to 0.450 in. The first three sections, with 21 teeth each, remove a chip 0.006 in. thick. The last finishing broach inserts have a chip load on the first tooth of 0.005 in., with gradual decrease to 0.001 in., the last two teeth being straight. The forward and return speed of the ram is 31 ft. per min., with a 54 in. stroke, giving a production from each ram of 170 pieces per hr.

Complex Clamping Required

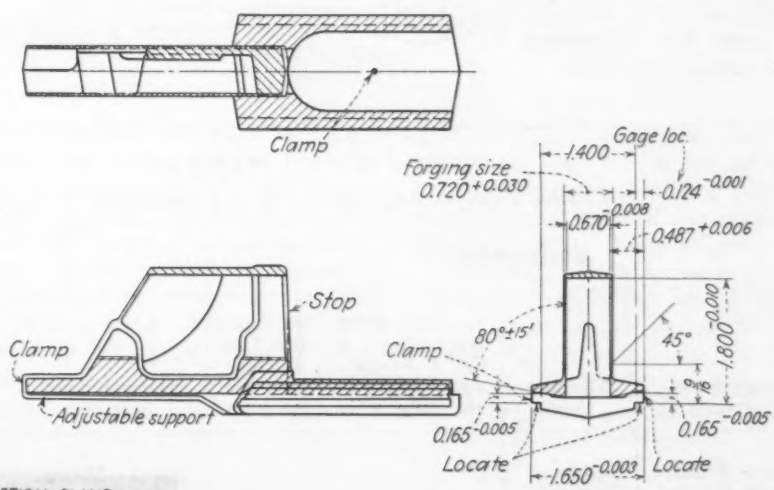
The following operation is known as Oper. 3, "finish broach left side, 20 deg. angle groove and 80 deg. angle," and is performed on the left ram of a second 5-ton, 54 in. Cincinnati duplex vertical broaching machine. The component is located in the fixture on the surfaces marked "Location" in Fig. 25 and is clamped and supported in the following manner. The plunger (not shown) forces the work against the left side locator so that the forging is located on surfaces broached in Oper. 1, using the same side for gaging as in Oper. 1A. (Fig. 24). The lower horizontal clamp forces the forging into the fixture and at the same time supports it vertically. The plunger and the clamp are operated by the lever shown on the back of fixture through a combi-



o o o

FIG. 24 — In this fixture, Oper. 1A is performed. It consists of broaching the top of the trigger guard and the 80 deg. angle. Support of the piece against broach tool loads is featured.

o o o



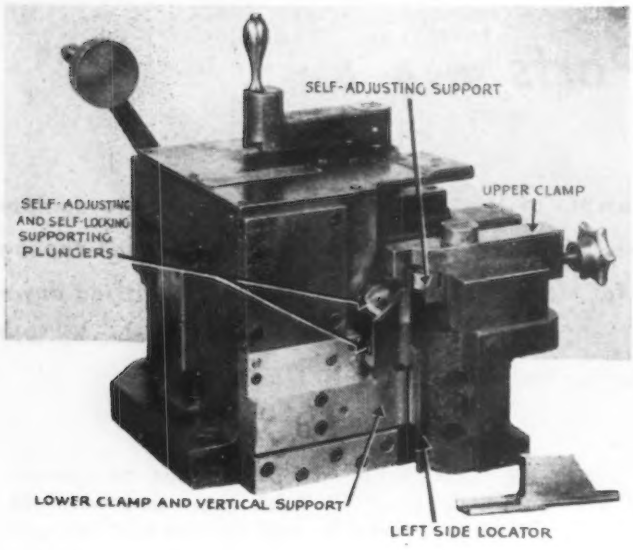


FIG. 25—Oper. 3, finish broaching the left side, 20 deg. angle groove and the 80 deg. angle, is performed in this fixture. The cuts taken are shown in the sketch.

The upper clamp and self-adjusting support actuated by the knob shown at the right function as follows: In order to permit loading, the clamp carrying the knob swings on a vertical pivot, but when in its loaded position as shown, the entire mechanism has horizontal movement to permit the clamp to hold work rigid in its natural position without any distortion. When the clamp adjusts itself to the work position the entire mechanism is clamped securely by single movement of the knob.

The maximum metal removal is 0.110 in. in the groove. The chip load per tooth on the roughing broaches is 0.005 in., decreasing to 0.001 in. per tooth on all finishing broaches cutting the side and 80 deg. angle.

nation of racks, pinions and wedges which hold the work securely in position while the cut is made. Two self-adjusting and self-supporting plungers operated by the top lever counteract the pressure created by the cutting tools on the thin wall of the forging. These plungers cannot recede under pressure due to an angle on the supporting plungers and spring actuated locking plungers which set up a wedging action when the supporting plungers contact the work.

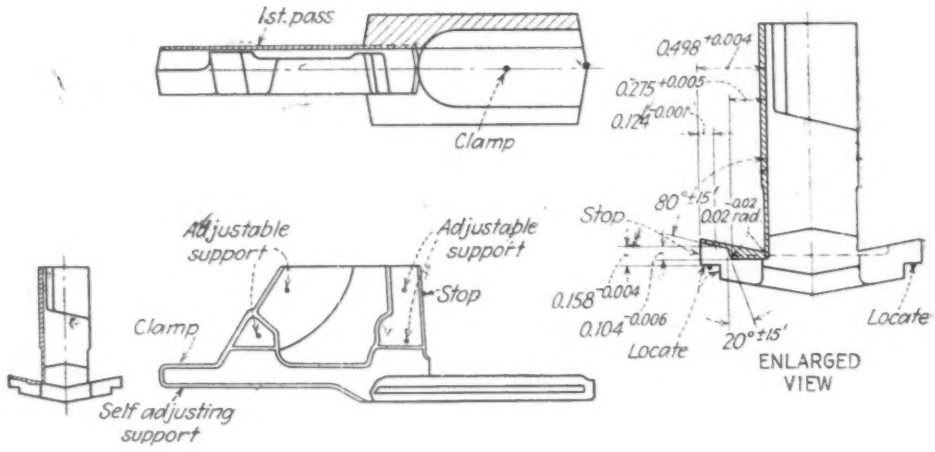


TABLE III

Comparative Table of Broaching vs. Milling Operations on the Garand Trigger Housing

BROACHING					MILLING				
Description of Operation	Machine Used	Net Pcs. Per Hr.	No. Mach. Req'd. to Produce 1000 Pcs. Per 8 Hr.	No. Opers. Req'd. to Produce 1000 Pcs. Per 8 Hr.	Description of Operation	Machine Used	Net Pcs. Per Hr.	No. Mach. Req'd. to Produce 1000 Pcs. Per 8 Hr.	No. Opers. Req'd. to Produce 1000 Pcs. Per 8 Hr.
Oper. 1—Broach edges to size and bedding surfaces	5-54 in. Cincinnati duplex vertical broach	171	1	1	Oper. 1—Milling edges to finish size and mill bedding surfaces	2-18 in. Cincinnati miller	50	3	1
Oper. 1A—Rough broach top and 80 deg. angle	Same	171			Oper. 2A—Rough mill top, sides, and 80 deg. angle	3-24 in. Cincinnati miller	36	4	2
Oper. 3—Finish broach left side 20 deg. angle, groove and 80 deg. angle	5-54 in. Cincinnati duplex vertical broach	155	1	1	Oper. 2—Finish milling sides, top, groove, and angle Two cuts—one part finished at each pass	No. 12 B & S miller	24	6	2
Oper. 4—Finish broach right side 20 deg. angle, groove and 80 deg. angle	Same	155							
		Totals	2	2			Totals	13	5

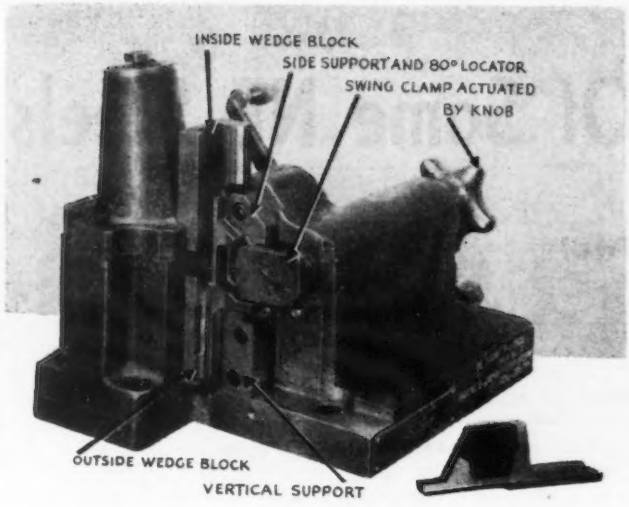
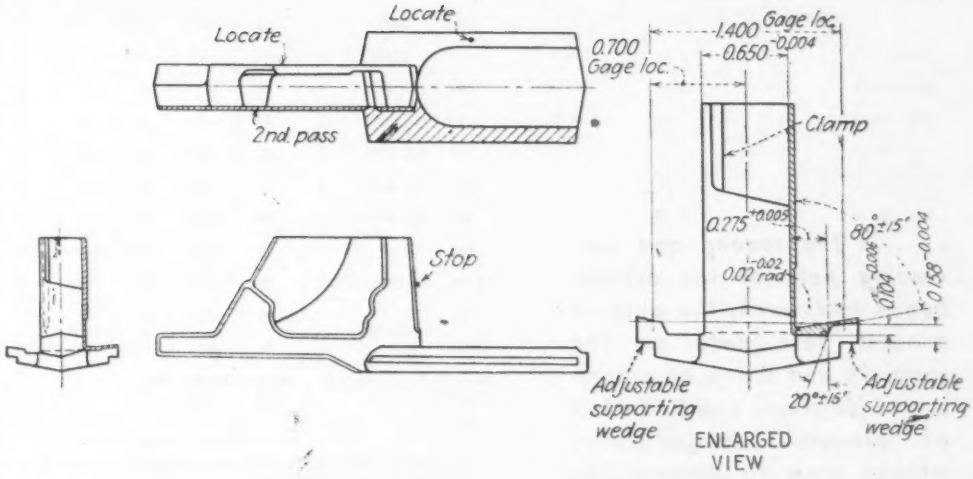


FIG. 26—The trigger guard housing is partially supported in wedge blocks while Oper. 4 is performed. This consists of finish broaching the right side, the 20 deg. angle groove and the 80 deg. angle.

The right hand ram of the same machine is equipped with a fixture and broaches to perform Oper. 4, "finish broach right side, 20 deg. angle groove and 80 deg. angle." As shown in Fig. 26, the component is located on its left side and the 80 deg. surface broached in the preceding operation. The component is held in the fixture with two wedge blocks which force it against a side support and the 80 deg. locator which at the same time takes up pressure created by the cutting tools. The lever shown on the back of the fixture operates both wedge blocks, which contact the surfaces marked "adjustable supporting wedge" in the sketch. The inside wedge block holds the forging in a rigid manner, while the outside wedge block is permitted to float a slight amount to take up variations due to both surfaces not being exactly in alinement with each other. In addition to this type of clamping there is a swinging clamp which holds the part against the left surface broached in the previous operation and applied against the hollow part of the component, as indicated by word "clamp" on the drawing. This swinging clamp is narrow enough to clear the cutting tools. Vertically, the component is supported with a hardened block at the point marked "stop."



The amount of metal to be removed is the same as in the previous cut and the chip load per tooth on the roughing and finishing tools is also the same. Forward and return speed of the ram is 31 ft. per min. with a 54 in. stroke of the machine, giving a production of 155 pieces per hr., which is lower than for the previous broaching operation. Compared with other broaching operations on the same component, the reduction in hourly output is due to the use of a more elaborate fixture and clamping arrangement.

In Table III are indicated all four broaching operations compared with milling, showing production per hour, number of machines required, and number of operators required to produce 1000 pieces per 8 hr. To meet this production requirement, two broaching machines are used and two operators. However, if milling methods were retained 13 milling machines would be required and five operators. Since Springfield Armory operates on a three-shift schedule, three times the number of operators would be required, namely 15 for milling as against six for broaching.

[In the succeeding article, broach tooling for a smaller and more fragile part of the rifle will be illustrated.]

Heat Resisting Plastic Developed

A NEW molding compound of lucite methyl methacrylate resin, combining heat-resistance 30 to 40 deg. F. higher than general-purpose powders and other desirable properties previously unobtainable in a single formulation, is announced by the plastics department of E. I. du Pont de Nemours & Company, Arlington, N. J. When properly heated dies are used, the faster setting properties of the new formulation, designated as HM-122, contribute to a shorter molding cycle. The material from this new formulation has added resistance to breakdown from heat at molding temperatures, producing not only better moldings but improved clarity, it is said.

Moldings of the new lucite also possess excellent reflecting properties and are exceptionally free of distortion when molded properly. This new formulation can be obtained in a wide range of transparent, translucent and opaque colors for both indoor and outdoor use. These advantages, together with light weight, exceptional toughness, and good dimensional stability under exacting operating conditions, indicate the HM-122 formulation can be expected to find acceptance as a material for postwar commercial and industrial products, including taillight and other colored lenses, covers for running lights of planes and ships, and wherever transparent protective coverings operate under high temperatures.

Physical Properties Of Some NE Steels

(Part Two)

By WILLIAM C. STEWART
Principal Metallurgist,
U.S. Naval Engineering
Experiment Station
and
RICHARD E. WILEY
Materials Engineer,
Bureau of Ships

. . . In the second and concluding part of the article, begun last week, the authors present test data on the strength and creep of a number of NE steels and SAE 4140 at elevated temperatures with a view to determining whether they would meet Navy requirements for high temperature bolt steels. They do not. The data originally appeared in the August, 1944, Journal of the American Society of Naval Engineers.

SINCE some of the NE steels as well as SAE 4140 steel had been proposed for use as high temperature bolting materials, it was desirable to investigate their high temperature properties at the same time that the general study reported last week was being made. The chemical analyses of the steels selected are given in Table IV, with the results of various tests in Tables V, VI, VII, and VIII.

The static tension test results show that neither the NE steels nor SAE 4140 steel meet the requirements of Navy Department Specification 43B14C for high temperature bolting material with regard to tensile strength when normalized and tempered at 1200 deg. F., but do meet

TABLE IV

Chemical Composition of Steels Tested at Elevated Temperatures

EES Desig.	NE No.	Bar Desig.	Chemical Composition, Per Cent									
			C	S	P	Mn	Si	Cr	Ni	Mo	W	V
WZ	SAE 4140	A	.46	.029	.020	.92	.21	1.06		.20		
		B	.45	.025	.022	.93	.21	1.03		.22		
		C	.45	.027	.022	.92	.21	1.05		.22		
VX	NE 8739	1	.36	.01	.018	.83	.30	.50	.42	.22		
VJ	NE 8749	1	.52	.01	.01	.85	.26	.56	.35	.20		
WA	NE 8749	2	.40	.049	.02	.90	.22	.50	.60	.46		
VZ	NE 8949	1	.45	.022	.03	.84	.20	.58	.54	.34		
XD	NE 8949	1	.44	.012	.022	1.10	.25	.54	.46	.33		
QG	Cr-MoV		.41	.013	.014	.44	.26	.93		.48		.22
QWA			.38	.010	.012	.64	.19	1.02		.48		.24
QV	Cr-MoW		.39	.050	.021	.76	.25	.38		.59	1.08	
QVA			.38	.020	.023	.76	.24	.63		.60	1.19	
Navy Dept. Specification 43B-14C (1)			Max. .50	Max. .045	Max. .04			Max. 2.0		(2) Min. .45	(2) Min. .75	

(1) Steels containing additional elements such as Cr, W, Ni or V may be usd.
(2) Tungsten or molybdenum.

TABLE V

Results of Tension Tests at Room Temperature for SAE 4140 Steel—(WZ)

Tempering Temp. Deg. F.	Tensile Strength	Yield Strength (1% Set)	Proof Stress	Elastic Limit	Prop. Limit	Elong. in 2 In.	Red. of Area
	LB. PER SQ. IN.					PER CENT	
NORMALIZED AT 1650 DEG. F. AND TEMPERED AS INDICATED							
1000	141,500	105,900	96,500	88,500	86,250	19.5	52.2
1100	139,150	104,400	96,000	85,500	83,750	19.5	52.3
1200	116,500		85,900	85,150		21.0	60.0
1300	108,000	75,500	73,250	70,500	67,500	21.0	61.8
1400	97,500	56,250	55,000	53,750	47,500	26.8	63.5
1550	108,900	58,750	57,250	55,000	51,250	22.0	48.2
NORMALIZED AT 1600 DEG. F., OIL QUENCHED FROM 1550 DEG. F., TEMPERED AS INDICATED							
1000	194,000	179,000	173,000	165,500	162,500	13.5	48.6
1100	177,600	164,750	158,500	151,500	145,000	16.3	48.8
1200	136,250		127,300	125,900		21.0	60.7
1250	128,700		119,500	118,700	117,500	24.0	59.8
1300	118,600	110,000	108,100	106,100	101,300	24.9	62.9
1400	95,900	75,850	75,000	72,500	70,000	28.0	67.6
1550	110,000	58,450	57,000	49,250	42,500	21.8	48.4

TABLE VI

Results of Tension Tests at Room and Elevated Temperatures—Bolt Steels

Steel	EES Designation	Heat Treatment	Testing Temp. Deg. Fahr.	Tensile Strength	Yield Strength (1% Set)	Proof Stress	Prop. Limit	Elong. in 2 in.	Red. of Area	Modulus of Elasticity (Nominal)
				Lb. Per Sq. In.				Per Cent		Lb. Per Sq. In.
SAE 4140 ASTM B-7 1" dia. Stock	WZ	N 1650° F T 1200° F	Room	115,500	86,500	86,000	75,000	21.0	59.3	31,000,000
			850	90,000	62,500		43,800	29.0	77.6	
			950	77,000	60,000		36,300	34.5	83.2	
			1000	73,000	50,000		33,000	35.5	86.2	19,400,000
			1100	57,000	34,500		23,500	36.5	86.3	
			1200	34,000	15,000		6,000	47.0	88.9	8,800,000
		N 1600° F O 1550° F T 1250° F	Room	128,700	119,500	119,500	117,500	24.0	59.8	29,100,000
			850	101,500	70,500			27.0	79.6	
			950	85,500	51,500		32,500	24.5	86.4	
			1000	81,500	42,500		18,500	27.0	88.4	17,000,000
		N 1600° F O 1550° F T 1300° F	Room	118,600	110,000	108,100	101,300	24.9	62.9	30,200,000
			850	83,000	58,700		33,800	25.0	75.9	22,700,000
			1000	71,000	41,000		17,500	31.0	88.5	18,900,000
NE 8739 1" dia. Stock	VX	N 1600° F T 1200° F	Room	105,000	84,700	81,500	75,000	27.0	58.5	30,500,000
			750	90,500	58,800		48,700	30.5	72.2	24,200,000
			850	81,000	55,000		40,000	32.5	73.5	
			950	72,000	50,000		31,000	34.0	79.2	21,900,000
			1000	65,500	43,200		24,000	37.5	63.2	17,600,000
			1100	53,000	30,000		18,000	38.0	84.7	15,100,000
			1200	34,100	15,200		10,000	61.0	81.6	
		N 1600° F O 1550° F T 1200° F	Room	128,400	118,500	117,000		23.3	61.3	
NE 8749 1" dia. Stock	VJ	N 1600° F T 1200° F	Room	112,700	84,500	83,900	81,400	24.2	57.2	29,500,000
			850	84,500	55,600		37,000	30.0	79.3	24,300,000
			950	73,800	46,900		28,000	32.7	78.1	
			1000	68,200	47,000		26,000	39.8	81.8	19,900,000
			1100	52,500	31,500		14,500	49.0	85.0	15,000,000
			1200	35,500	15,000*			37.0	82.0	
		N 1600° F O 1550° F T 1200° F	Room	130,600	120,000	119,200		24.0	63.0	
NE 8749 1" dia. Stock	WA	N 1600° F T 1200° F	Room	151,500	122,800	118,400	110,300	18.5	55.3	29,100,000
			850	120,700	92,400		62,000	18.0	59.0	25,100,000
			950	107,000	86,300		48,700	20.0	63.5	24,100,000
			1000	87,000	65,000		27,500	25.0	77.4	19,700,000
NE 8949 1" dia. Stock	VZ	N 1600° F T 1200° F	Room	123,300	91,700	89,700	80,500	20.5	54.8	30,100,000
			750	112,000	82,500		63,700	22.0	60.6	23,700,000
			850	98,000	74,400		58,700	22.5	64.2	
			950	92,500	70,000		48,700	22.5	65.9	21,500,000
			1000	86,000	65,000		42,500	23.0	69.2	18,300,000
			1100	61,000	45,000		25,000	29.5	77.2	17,800,000
			1200	47,000	25,500		15,000	36.0	86.1	11,800,000
		N 1600° F O 1550° F T 1200° F	Room	145,200	13,700	129,700		20.5	58.6	
NE 8949 1" dia. Stock	XD	N 1600° F T 1200° F	Room	119,000	89,500	89,200	87,400	22.5	58.5	29,000,000
		N 1600° F O 1550° F T 1275° F	Room	128,700	122,500	122,000	118,000	21.0	61.8	30,000,000
			850	91,000	65,700		33,800	27.0	74.6	25,000,000
			950	84,000	60,100		31,200	25.0	85.0	22,300,000

N—Normalized. O—Oil quenched. T—Tempered. *—Approximate.

TABLE VI—Continued

Results of Tension Tests at Room and Elevated Temperatures—Bolt Steels

Steel	EES Designation	Heat Treatment	Testing Temp. Deg. Fahr.	Tensile Strength	Yield Strength (1% Set)	Proof Stress	Prop. Limit	Elong. in 2 In.	Red. of Area	Modulus of Elasticity (Nominal)
				Lb. Per Sq. In.				Per Cent		Lb. Per Sq. In.
Cr-Mo-V ASTM B-14 1" dia. Stock	OG	As Received	Room	144,300	120,000	117,000	96,700	19.5	54.2	30,800,000
	OWA	N 1725° F T 1200° F	Room	144,900	121,000	120,000	100,000	17.8	55.5	30,300,000
			850	112,000	86,200		62,500	21.3	66.3	
			950	98,700	79,200		45,000	20.7	69.9	23,700,000
			1000	94,500	73,500			25.0	71.4	
			1100	80,500	49,400			26.0	77.3	
			1200	59,000				25.5	69.8	
Cr-Mo-W ASTM B-13 ⅞" dia. Stock	QVA	N 1725° F T 1200° F	Room	129,100	95,000	91,700	67,500	21.8	57.9	30,600,000
			850	113,500	84,400		56,000	20.5	60.8	
			950	107,500	80,000		35,000	16.8	58.1	24,900,000
			1000	89,000	70,000			20.5	68.3	20,400,000
			1100	80,500	58,700			16.5	67.4	
			1200	40,000	21,000			28.5	83.6	
Cr-Mo-W 1" dia. Stock	QV	As Received	Room	121,700	120,000	115,000	105,000	19.0	57.0	30,800,000
			950	77,500	60,000		37,500	28.0	75.8	21,200,000
Navy Department Specification 43B14C			Room	Min. 120,000		Min. 100,000		Min. 18.0	Min. 50.0	

N—Normalized. O—Oil quenched. T—Tempered. *—Approximate.

them in regard to ductility. These steels will meet the requirements of this specification in regard to tensile strength, proof stress, and ductility when oil quenched from 1550 deg. F. and tempered at 1200 deg. F.

Test results obtained thus far at 950 deg. F. temperature show that the stress-rupture strength values for the NE steels and SAE 4140 in the normalized and tempered condition are superior to those obtained for the oil quenched and tempered condition. The stress-rupture values obtained for the alternate bolting materials increase with increase in molybdenum content, but are inferior to the standard Cr-Mo-W bolt steel, material QWA.

Similarly, creep test results obtained for SAE 4140 in the normalized and tempered condition are superior to those obtained for the material in the oil quenched and tempered condition.

Although a number of creep tests are still in progress, the results indicate that SAE 4140 and the NE steels investigated do not have the high temperature strength properties required to meet Navy Department Specification 43B14C. Creep resistance is enhanced particularly by increasing the molybdenum content. For this reason, material WA (NE 8749) has indicated the maximum creep resistance of the NE steels tested. Material WA cannot be regarded as an NE steel, but meets the chemical requirements of Navy Department Specification 43B14C. Likewise, the molybdenum content for materials VZ and XD are slightly above the maximum of the range for NE steels, namely 0.20 to 0.30 per cent.

Navy's Appraisal

NE steels of the 8000 series herein described offer much promise as alternate materials for forgings, classes AN and HG of Navy Department Specification 49S2. Of the seven steels of this series, one is of the semi-thorough hardening grade, (NE 8630) and the others of the thorough-hardening grade. All have shown to good advantage when properly heat treated. Of the less hardenable steels, NE 8739 is a good representative material. Of the steels of greater hardenability, NE 8749 has shown good properties.

These steels are well adapted for heat treatment by normalizing and tempering. This procedure is desirable for large sections and the tempering temperature is not critical. The tempering temperature is more critical after oil quenching. In general, desirable properties can be obtained by normalizing and tempering at 120-1300 deg. F.

NE 9445 and 9450 steels are less satisfactory. These steels failed to meet either AN or HG requirements when normalized and tempered at 1200 deg. F. However, one of the NE 9445 steels meets AN requirements when normalized and tempered at 1300 deg. F. NE 9450 steel failed to meet either AN or HG requirements when normalized and tempered at 1200 and 1300 deg. F.

None of the samples showed any excessive amounts of non-metallic inclusions. Likewise, no flakes or cracks were encountered in the forgings.

The NE steels of this series are inferior to available high temperature bolting materials. In this type of material the high temperature strength depends upon molybdenum or tungsten. The NE steels contain no tungsten, and the molybdenum content is not sufficiently high for the necessary strength at elevated temperatures.

At the present stage of investigation, it appears that some of the NE steels, as well as other steels containing smaller amounts of alloys than were customarily used under peace time conditions, are capable of developing properties which are satisfactory for use in some applications in the Naval service.

TABLE VII

RESULTS OF STRESS RUPTURE TESTS

Steel	EES Designation	Heat Treatment	Temp. Deg. F.	Stress, Lb. Per Sq. In.	Time to Fracture, Hr.	Elong. in 2 In.	Reduction of Area	Stress to Fracture, In. Per Sq. In.	
						Per Cent		100 Hr.	1000 Hr.
SAE 4140 ASTM B-7 1" dia. Stock	WZ	N 1650° F. T 1200° F.	850	55,000	1845	31.5	75.9	64,000	56,000
			950	50,000	45.0	45.5	82.7	47,000	40,000*
				45,000	219	37.4	77.0		
		N 1600° F. O 1550° F. T 1250° F.	950	50,000	50.4	44.5	86.1	46,000	35,000
				42,000	204.7	46.5	86.1		
				38,000	535	60.5	86.5		
		N 1600° F. O 1550° F. T 1300° F.	950	50,000	20.2	35.5	83.9	44,000	38,000
				40 000	530.3	53.0	86.3		
NE 8749 1" dia. Stock	VJ	N 1600° F. T 1200° F.	950	50 000	64.9	43.5	69.9	45,000	42,000
				45 000	106	32.4	64.3		
				40,000	Removed After 2700 hrs.				
NE 8749 1" dia. Stock	WA	N 1600° F. T 1200° F.	950	75,000	14.7	21.0	71.6	66,000	53,000
				65,000	460	22.0	48.6		
				60,000	549	20.5	50.5		
				55 000	869	19.5	48.0		
NE 8949 1" dia. Stock	VZ	N 1600° F. T 1200° F.		60 000	901	12.0	23.6	61,000	52,000
				55 000	719	12.2	19.3		
				45,000	3364	6.5	9.5		
		N 1600° F. O 1550° F. T 1300° F.		55 000	9.6	22.0	77.4	48,000	42,000
				45 000	320	25.0	73.2		
NE 8949 1" dia. Stock	XD	N 1600° F. T 1200° F.	950	55 000	29.6	31.5	75.0	50,000	45,000
				45 000	1218	10.0	14.0		
			1000	45 000	102.9	34.0	48.6	45,000	
		N 1600° F. O 1550° F. T 1275° F.	950	50 000	37.8		79.8	46,000	37,000*
				45,000	147	37.0	71.3		
Cr-Mo-V ASTM B-14 1" dia. Stock	QWA	N 1725° F. T 1200° F.	950	75 000	108	19.0	62.4	75,000	61,000
				70 000	454	8.0	23.0		
				65,000	234	17.3	31.9		
			1000	55 000	241	11.0	21.3	60,000	43,000
				45 000	856	9.5	10.3		
Cr-Mo-W ASTM B-13 1" dia. Stock	QVA	N 1725° F. T 1200° F.	950	55 000	501	1.0	1.8	62,000	50,000
				48 000	1674	1.8	1.8		
			1000	40,000	1173	1.0	0.4		

N—Normalized. O—Oil quenched. T—Tempered. *—Extrapolated.

Analyzing the Foreman's Job

(CONCLUDED FROM PAGE 47)

dignity while helping to cement a feeling of kinship between the foremen and management.

An important way in which supervisory job analysis improves relations with the foremen is through reduction of the number of bosses to whom each reports. Even in a plant of average size, it is not uncommon for supervisors to be taking orders from five up to ten different executives. Such a condition not only brings about confusion but also impairs the foreman's status in the workers' eyes. No foreman should have more than one direct boss—a goal that can be reached only when the foreman's position is clearly charted before him.

An organization chart is a management tool of great importance, and a labor relations tool as well, not something just to stew over in conference and then put under glass on the president's desk. Every foreman and company executive should have a copy. The principles of organization which it embodies should be reviewed perennially at staff and foremen conferences. Copies should also be displayed where rank-and-file employees can see them, thus clinching the impression that the company is run along orderly, well organized lines.

Both supervisory job analysis and the organization chart will help to counter the feeling, so widespread today, that technicians and other quasi-professionals have taken over the foremen's prerogatives. This complaint is prevalent among veteran supervisors who tend to look back to the "good old days" when foremen hired and fired. In many cases they look backward, because they have no guide to help them look ahead.

Of the satisfactions that count in life, there are few which mean more to a man than the knowledge that he has a specific place to fill and that his place is recognized by both subordinates and superiors. By using the same job analysis techniques on supervisors as on toolmakers and lathe operators, the largest single reason for foremen disaffection may be removed.

TABLE VIII

RESULTS OF CREEP TESTS

Steel	EES Designation	Heat Treatment	Temperature Deg. F.	Stress, Lb. Per Sq. In.	Total Time Hr.	Total Creep in Per In	Creep Rate		Stress for 1% Creep in 10,000 Hr., Lb. Per Sq. In.
							Time, Hr.	Rate %/Hr.	
SAE 4140 ASTM B-7 1" dia. Stock	WZ	N 1650° F. T 1200° F.	850	30,000	(In Progress)				
			950	20,000	2188	.00572	250–2188	.000128	
				15,000	(In Progress)				
			1000	15,000	650	.01048	0–650	.00161	
		N 1600° F. O 1550° F. T 1250° F.	950	15,000	336	.00708	50–336	.09907	
		N 1600° F. O 1550° F. T 1300° F.	950	15,000	480	.00815	50–480	.001298	
NE 8739 1" dia. Stock	VX	N 1600° F. T 1200° F.	850	30,000	2708	.00159	250–2708	.000038	
				25,000	(In Progress)				
NE 8749 1" dia. Stock	VJ	N 1600° F. T 1200° F.	850	30,000	2088	.00291	750–2088	.000067	
			950	25,000	288	.01265	0–288	.00439	
			1000	15,000	1320	.00872	250–1320	.000556	
				20,000	288	.00791	0–288	.002746	
NE 8749 1" dia. Stock	WA	N 1600° F. T 1200° F.	950	25,000	(In Progress)				
NE 8949 1" dia. Stock	VZ	N 1600° F. T 1200° F.	950	20,000	(In Progress)				
			1000	15,000	1763	.00410	250–1763	.000202	
NE 8949 1" dia. Stock	XD	N 1600° F. T 1200° F.	950	20,000	(In Progress)				
Cr-Mo-V ASTM B-14	QG 7/8" dia. Stock	As received	850	40,000	1700	.00026	250–1700	.0000069	45,000
				45,000	3334	.00076	250–3334	.0000084	
			950	25,000	5160	.00075	250–5160	.0000063	
				30,000	5200	.00144	250–5200	.000017	27,000
				35,000	4210	.00236	250–5210	.0000314	
			1050	10,000	4470	.00181	250–4470	.0000317	
				15,000	3216	.00592	250–3216	.000157	7,500
				25,000	480	.00757	0–480	.001577	
	QWA 7/8" dia. Stock	N 1725° F. T 1200° F.	850	30,000	3000	.00075	1000–3000	.000014	
			950	25,000	3456	.00123	250–3456	.000019	24,500 Appr.
Cr-Mo-W ASTM B-13	QV 1" dia. Stock	As received	950	10,000	3072	.00324	250–3072	.000084	
				14,000	2712	.00550	250–2712	.000170	7,000 Approx.
				20,000	288	.00531	0–288	.001844	
				25,000	190	.00731	0–190	.003847	
	QVA 7/8" dia. Stock	N 1725° F. T 1200° F.	950	20,000	3288	.00060	250–3288	.000008	16,800 Approx.

N—Normalized. O—Oil quenched. T—Tempered.

Glycerine Enhances Electrochemical Processes

A REPORT from Russia describes the work of I. I. Terekhov and his associates (through *Chem. Abstr.* 38:4518, 1944) on the electrolytic deposition of manganese from glycerine-containing sulfate solutions. These investigators found that manganese can be deposited on iron, aluminum, copper, bronze or brass cathodes from solutions containing, per liter:

Manganous sulfate ($MnSo_4.5H_2O$)	100-200 gm.
Ammonium sulfate	75 gm.
Glycerine	50 cc.

This is used with a pH of 7 to 1.7 and a current density of 10 to 15 amp. per sq. decimeter at 15 to 20 deg. C. The solution must be agitated to secure a good deposit of fine crystalline structure, bright luster, and good adherence, ductility and hardness.

Another application of glycerine is described in compositions for the electro-deposition of molybdenum compounds as protective and decorative finishes. Although only small quantities of glycerine are specified in U. S. Patent 2,351,639, granted to E. W. Schweikher, its employment allows broadening of permissible current densities and greater pH variations and also improves the character of the deposit so that it will be more dense, more abrasion-resistant and more adherent.

A typical bath for the production of colored deposits contains the following ingredients per liter:

Boric acid	48.0 gm.
Sodium molybdate	22.5 gm.
Molybdic oxide	15.0 gm.
Nickel sulfate	30.0 gm.
Sodium thiocyanate	3.8 gm.
Glycerine	0.75 cc.

This is used at current densities of 0.1 to 10 amp. per sq. ft. at a preferred temperature of 70 deg. C.

Shankless Twist Drill Introduced

SHANKLESS is the name given a new style high speed steel drill with a continuous flute that is driven by a removable taper shank generally furnished with a Morse taper to fit the spindle of the operating machine or drill press. Drill drivers have been widely used for over 25 years for driving the smaller sizes of conventional straight shank drills.

Although just introduced publicly for the first time by Republic Drill & Tool Co., Chicago, this new type of drill has been in use for over six years at the Ford Motor Co., where it was developed by Raymond R. Rausch, now general superintendent of the River Rouge plant. Ford is the only drill user in the country which makes twist drills and has manufactured hundreds of thousands of the shankless drills for its own use.

Unconventional methods of manufacturing these drills give these drills greater strength and toughness over Republic's standard drills and yet are priced 20 to 30 per cent lower. Principal difference in manufacture is that the flutes are formed by twisting roll formed bar stock, instead of milling the flutes out of a solid bar. Fig. 2 shows the three initial steps in the process. After heating the mill formed bars *A* to forging temperature, the first step in the process is to roll forge the flute contour and margin in the straight bar as shown at *B*. The bar is then chucked between two floating drivers while it is twisted uniformly from each end through hydraulically actuated racks engaging pinions. Press forging is a term applied by Republic to the third operation which consists of planishing the twisted bar between flat plates. This operation straightens it and sizes the margin diameter, at the same time improving its structure by the mechanical work. As a result, margins stand up better, giving more holes per grind and more grinds per inch of flute, Republic states.

The method of manufacture results in a drill of uniform cross-section, whereas a standard drill has a tapered web. The extra thickness of web at the lower portion gives the shankless drill extra strength and is said to contribute to greatly increased performance and longer drill life. At the same time, the neck of the drill is toughened by heat treatment

(CONTINUED ON PAGE 136)

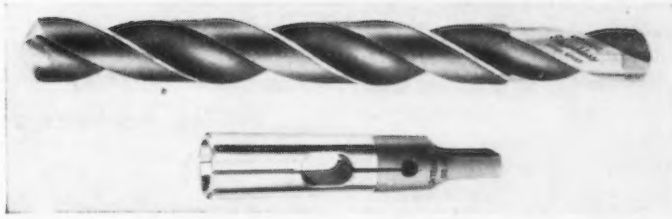


FIG. 1—Shankless drill and Republic drill driver. Seven sizes of standard drivers take care of 135 shankless drills from 1/4 to 2 in. diameter.

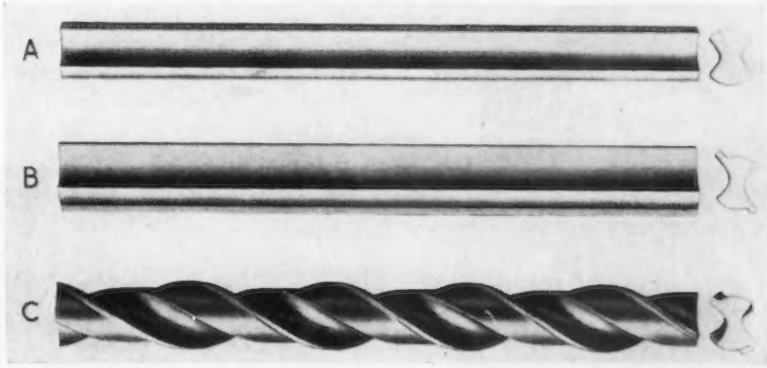


FIG. 2—Three stages in the forming of Republic's new roll forged drills. (A) Grooved high speed steel as received from the mill. (B) Flute contour and margin produced by hot roll forming. (C) Hot twisted drill ready for flute grinding to clean up decarburized surfaces. Bars come in 4 to 6 ft. lengths and are later cut to size with abrasive cutoff wheels.

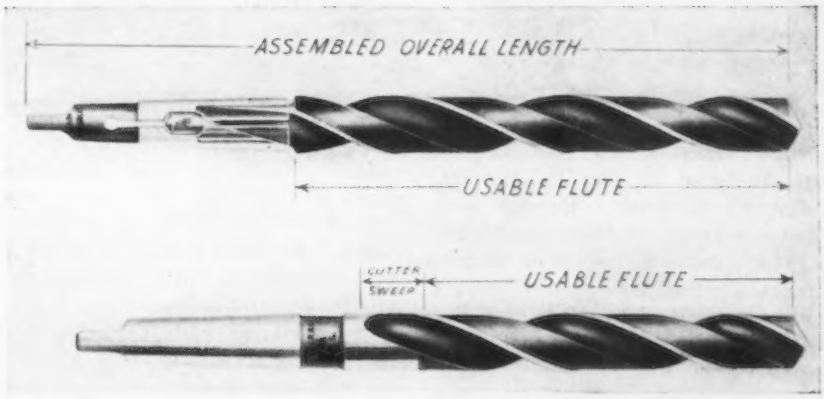


FIG. 3—Usable flute length and overall length of drills compared. With driver, the shankless drill may be as much as 7 per cent longer than a standard taper shank drill. There is much greater usable flute in the former since the shankless drill has a spiral flute extending directly into the driver, whereas the flute of the conventional taper shank drill ends at a considerable distance below the shank, as shown.

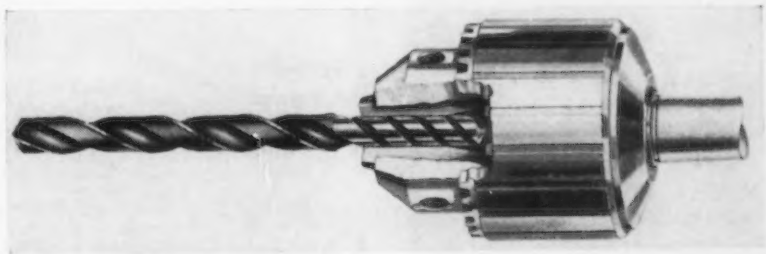


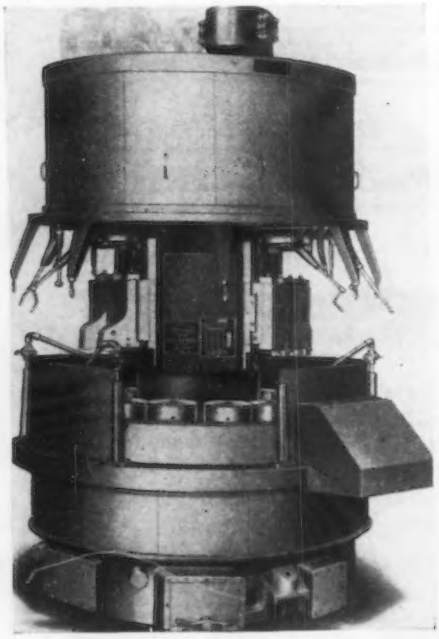
FIG. 4—Republic "All-Flute" straight shank drill gripped in a conventional drill chuck. This roll forged drill is given an extra twist at the end, causing the spiral flutes to be compressed so that the shank can be readily chucked.

New Equipment . . .

Machine Tools

. . . Recent developments in chucking, boring, milling, reaming and drilling machines are described in the following pages.

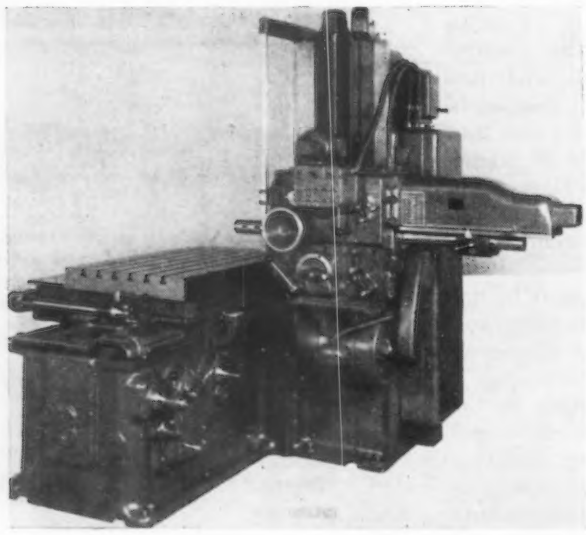
TWIN spindle Mult-Au-Matics which provide double production on one machine in chucking the small-



er classes of work up to 8 in. have been developed by the *Bullard Co.*, Bridgeport 2, Conn. Having twin spindles at each of the six or eight stations, a total of twelve or sixteen spindles the machine has. Two are used for loading while the balance are used for machining. Twin tooling on the head at each station performs identical operations on the work in each of the twin chucks. Chucking is accomplished by means of an automatic hydraulic chucking mechanism which is adjustable for pressure. To meet tooling conditions, the machine is provided with plain vertical, plain compound and universal tool heads. For work requiring drilling operations duplex live spindle drill heads may be applied.

Jig Borer and Miller

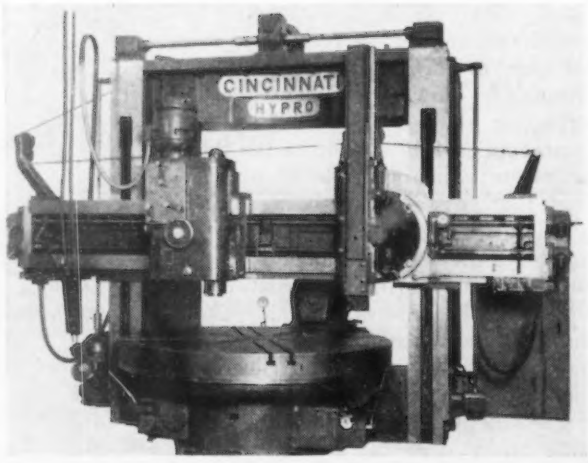
A MODEL 3-B, 3 in. bar Jigmil has been announced by the *DeVlieg Machine Co.*, Ferndale, Detroit, Mich. Automatic positioning makes it possible to automatically position the spindle and table from one location to another accurately to within 0.0001 in. in response to precision and measuring rods and push buttons. Controlled pressure locking clamps the slides with controlled uniformity. Retraction of the table and work from the cutting position is push button controlled. All gears are finish shaved for smooth operation. The machine



has 24 spindle speeds from 22 to 1200 r.p.m. Bar feeds are in thousandths per revolution from 0.001 to 0.016 in. Milling feeds to the table and the head are selected with a dial quick change mechanism providing a range from 0.3 to 15 in. per min. Table dimensions are 30x48 in., vertical movement 37 in., starting with a center 1 in. below the top of the table and extending to 36 in. above the top of the table.

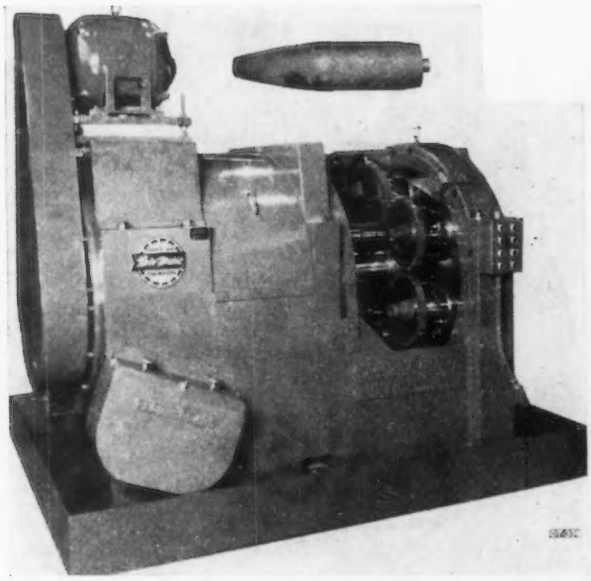
Boring & Milling Machine

DESIGNED for special production jobs on which there is a certain amount of boring and turning and on which in the same setup pads or slots are to be milled, a combination boring and milling machine has been developed by *Cincinnati Planer Co.*, Cincinnati 9, Ohio. There are 16 table speeds in geometric progression ranging from 1 to 30 r.p.m. A low horsepower motor drives through a worm drive box providing milling feeds from 2 to 80 in. per min. A positive locking device is provided on the table for cross milling. A one-piece conical type square locked design swivel is used on the boring head so that twisting strains inherent in boring and turning are distributed over the whole area. Feed on the boring head ranges from 1/96 to 0.8 in. in 12 mechanical gear changes in geometric progression. There are 12 speeds in the milling head that range from 21 to 377 r.p.m.



Special Boring Machine

A SINGLE and horizontal rotary continuous boring machine with 6 stations for the boring and facing of 155 mm. shells has been developed by *Davis & Thompson Co.*, 6411 West Burnham Street, Milwaukee 14. Automatically operated collet chucks in-



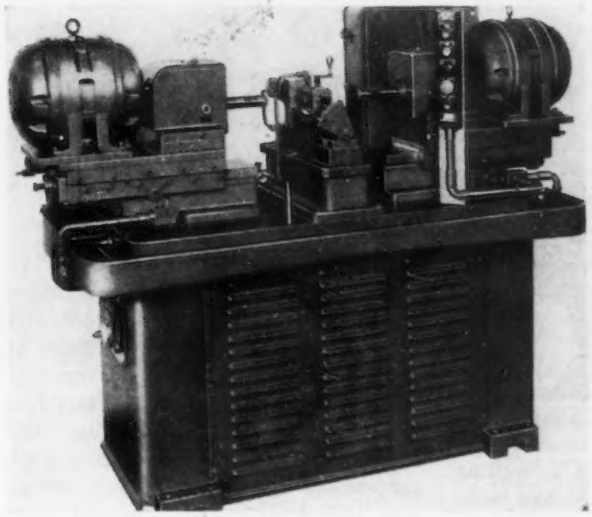
sure perfect concentricity of the holes with the outside diameter. Shells are manually loaded from a conveyor. Locating for length is automatic from the boattail end by a spring cam and a positive stop. The chucks holding the parts are automatically closed and rotation of the chucks is started by means of a clutch mechanism.

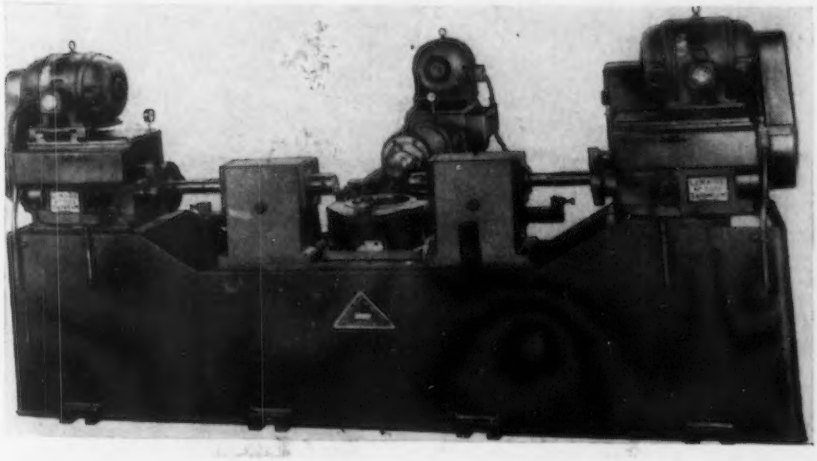
Special Way-Type Driller

A SPECIAL horizontal 3-way machine for boring five holes and facing four holes in a truck axle mounting or carrier has been designed by *Le Maire Tool & Mfg. Co.*, Dearborn, Mich. It consists of two heavy-duty spindle quill assemblies on a main base, with another assembly (slide type) of two spindles at right angles to these mounted on a rear base. All three are actuated by Le Maire No. 5000 twin ram hydraulic units. All parts are rough bored and finish faced in one operation at a rate of 50 pieces per hr. A second operation is required for finish boring all holes to 0.001 tolerance. The spindle quill assemblies are mounted on precision bearings for guiding the boring bars and maintaining accurate alinement.

Drilling and Reaming Machine

A TWO-WAY machine for drilling and reaming has been announced by *Snyder Tool & Engineering Co.*, 3400 East Lafayette, Detroit 7. Machine slides are way-type and are individually fed by hydraulic cylinders. In the machine, illustrated, a single spindle drill head and drive motor are installed on a dovetail sub-slide which is provided to permit adjustments and exchange of tools. Hydraulic feed is approximately 4 in. On high production where the operation is not especially complicated the machine can be equipped with hopper or magazine to feed the parts into the fixture.



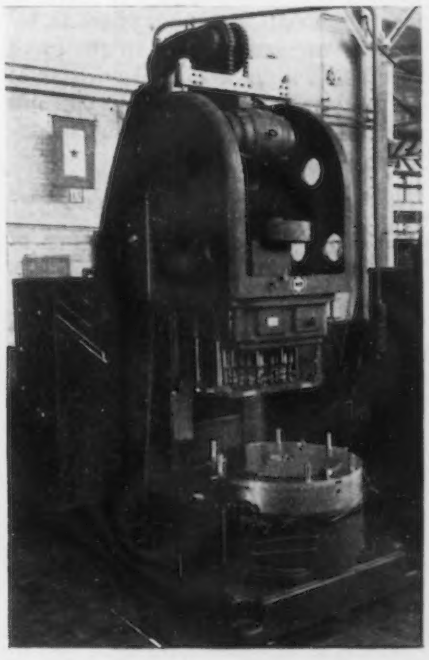


Planer Table Control

A METHOD of pendant planer control for planer tables has been announced by *G. A. Gray Co.*, 3611 Woodburn Avenue, Cincinnati 7. The operator identifies the hard spots and inclusions with a chalk mark and starts his machine operating with the normal cutting speed which would be used on the type of material free from hard spots. As the hard spot approaches the cutting tool, the operator presses the special button marked "Slow-Down," causing the table to slow down. When the tool leaves the hard spot, the operator releases the button and the table resumes the normal speed predetermined by the rheostat setting.

Hydraulic Multiple Spindle Drill

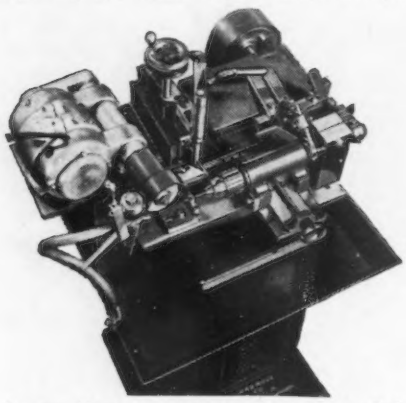
DESIGNED for heavy duty single or multiple spindle drilling, boring, reaming or milling operations, a Defiance No. 540 vertical hydraulic feed machine has been announced by *Defiance Machine Works, Inc.*, Defiance, Ohio. The column is a heavy type cored casting with long ways which carry the head slide. The ways are oiled by a Bijur oiling system. The column supports the hydraulic feed cylinder which operates the head and also encloses the counterbalance



weights. The machine is provided with an automatic cycle of rapid approach, feed (adjustable) and rapid return to stop. The cycle can be arranged with a dwell at the end of the feed if desired. The head is driven through a multiple V-belt and provided with one pair of pick-off change gears to give a speed of from 200 to 500 r.p.m. as selected at the power take-off. The main drive bracket and head are automatically lubricated.

Reamer Flute Grinder

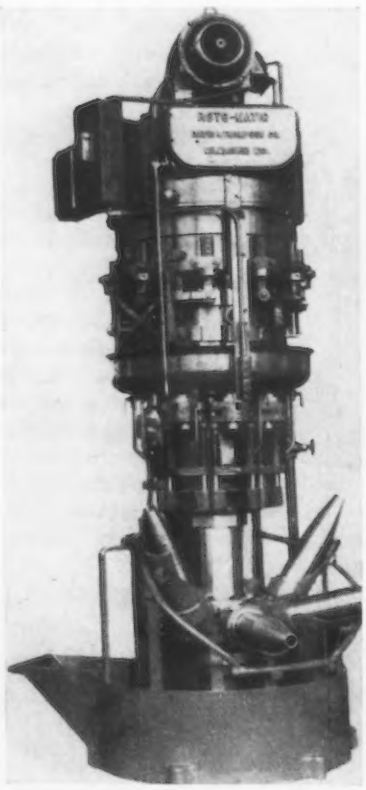
A MACHINE which will automatically grind straight and spiral flutes from the solid in small reamers and taps and which can be conveniently arranged for other classes of work has been announced by the *Wardwell Mfg. Co.*, Cleveland 9. The machine can handle reamers as small as 1/16



in. in diameter. It is also adapted for small counterbores, teeth in side milling cutters, angular cutters, as well as for sharpening saws from ½ to 8 in. in diameter. The work is automatically fed through an index plate which is fastened to the other end of the work arbor. For grinding spiral work or where a small grinding wheel is required, an independent high speed grinding unit is arranged on a shelf of the vertical slide so that the unit can be swiveled to any degree required for spiral work.

Vertical Reaming Machine

DESIGNED for the reaming of the nose end of 155 mm. shells, a D & T Roto-Matic vertical reaming machine has been developed by *Davis & Thompson Co.*, 6411 West Burnham Street, Milwaukee 14. As the machine rotates, the outside cam carries the shell into the clamping position. At a predetermined point the cutter spindles automatically feed and at the same time actuate the clamping mechanisms. On the completion of the operation the spindle is automatically withdrawn and the clamping mechanism released. Machine operation is continuous and non-indexing.

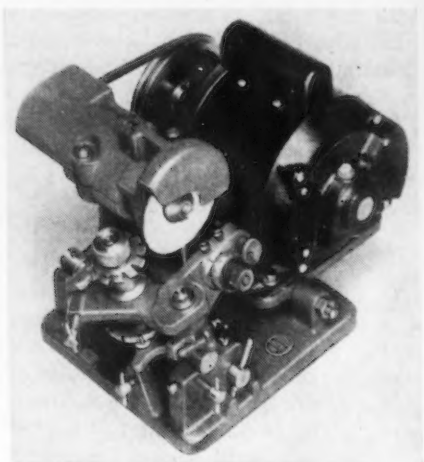


Tube Burring Machine

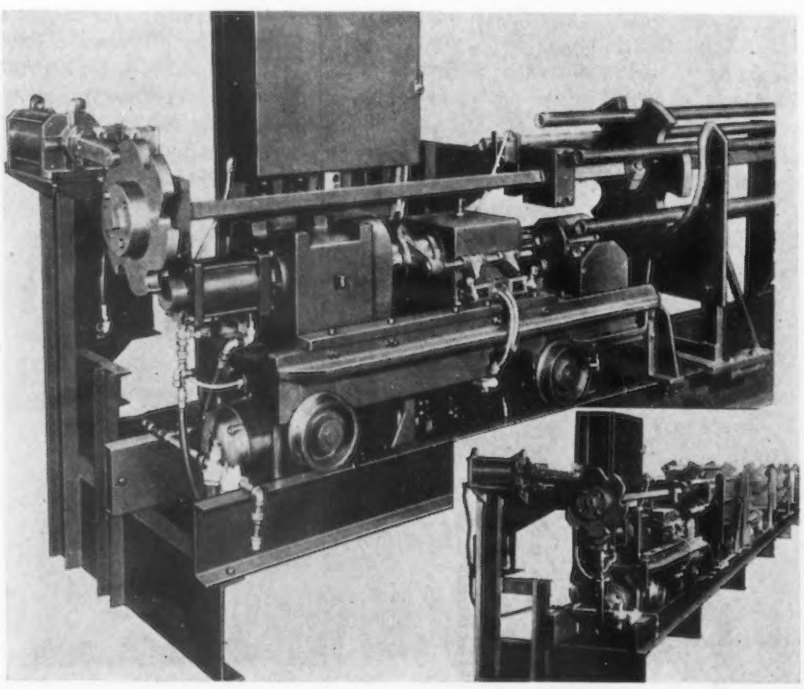
A COMBINATION automatic reaming and burring profiler for handling tubes up to 6 in. o.d. and lengths from 3 to 60 ft. or longer is announced by *Pines Engineering Co.*, Aurora, Ill. The head assemblies which consist of the spindles and chucks are mounted on heavy cars suspended on flanged wheels which are anchored to the channel iron track. One car can be moved to position for processing any length of tube desired. Tubes are fed to and from the profiler by means of an automatic mechanism which selects tubes from storage rails regardless of diameter. The indexing mechanism, automatic self-centering type chucks and the spindle advance are all actuated hydraulically. Production of 200 to 400 tubes per hr. can be obtained on end facing and burring operations and 100 to 200 tubes per hr. where inside reaming is required.

Cutter Sharpener

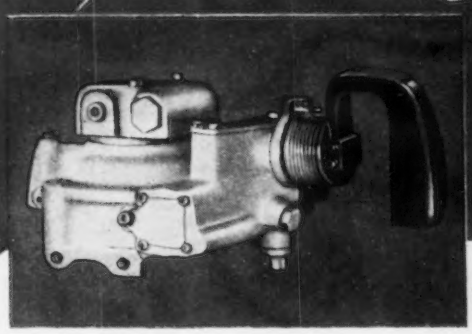
A CUTTER sharpener designed for sharpening of cutters used for gear cutting and thread milling circular form tools, straight fluted hobs and multiple cutters is announced by *Edward Blake Co.*, 634 Commonwealth Avenue, Newton Centre 59, Mass.



The maximum diameter of cutter the machine will sharpen is 2 in. and the maximum thickness ⅜ in.



POWER THAT OBEYS A TWIST OF THE WRIST



Oilgear generator (pump) which supplies fluid power to an Oilgear motor for traversing turrets in all tanks mentioned and many others. These Oilgear systems provide high traverse speed, exceptionally accurate control and dependability.

Oilgear's EAGER RESPONSIVENESS MAY WIN A POSTWAR BATTLE FOR YOU

Alert and forward-looking "peace" machine designers and users are finding new paths to efficiency by watching the performance of machines of war . . . at war. Take for example, America's newest M3 and M5 light tanks and M4 mediums. Here, in all these, is power at the twist of a wrist, supplied by Oilgear Fluid Power systems, to enable the gunner to traverse and train the turret (and guns) on the target, quickly, accurately and without effort. He gets extreme speed instantaneously when searching out a new target. He gets extreme deceleration when he has found it, and low tracking speed as he trains his gun on the moving target or when he is moving past a stationary target. In brief, he has instantaneous torque, extreme range of speed, steplessly variable speed from zero to maximum and return. He has tremendous power in small compass. He has absolute control over power and speed, in this case, from a simple handle which he twists from side to side. Whether *you* need *these* Oilgear characteristics or a combination of scores of other functions to improve a machine, better its operation or solve a hitherto "impossible" problem, write and ask Oilgear engineers for their recommendations. There is no obligation of course. . . . THE OILGEAR COMPANY, 1303 West Bruce Street, Milwaukee 4, Wisconsin.

ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R. P. M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

You Need Oilgear!

OILGEAR

Fluid Power

Assembly Line . . . STANLEY H. BRAMS

• Cleveland automotive suppliers expect they will be ready whenever reconversion may come . . . New machine tools and new automobile parts are awaiting go-day.

CLEVELAND, O. — This city, which supplies a fourth of the nation's automobile parts, and about the same proportion of aircraft components during the war, opened its factories last week to a group of industrial writers to establish that when reconversion comes the parts plants will be ready.

That much was evident after a two-day tour, and of course it was hardly unexpected. The auto industry's reconversion problem will be machine tools, not car components; and with the prospects of early changeover constantly becoming more dim, even the tooling problem may not be so fearsome.

One automobile company was visited along with the suppliers. White Motor Co. outlined ambitious postwar plans now being developed in the front offices while the factory departments plow along under heavy and recently enlarged contracts for prime mover trucks. White believes that its enlarged distributor organization—extended from 156 outlets before the war to 650 today—will give it the fullest possible participation in the big truck and bus market ahead.

White believes there will be greater utilization of heavy trucks after the war than ever before. If this often-expressed anticipation proves out, the company should be in excellent position, because its past output has largely centered on the larger sizes. At the same time, White plans postwar continuation of its "White Horse" door-to-door delivery vehicles which were so successfully introduced in the late thirties. A number of innovations are being worked out for its postwar buses, probably the most important of which will be a changeover from mechanical transmission to torque converter. In going into orthodox production of such items after the war no reconversion problem at all will exist at White, where manufacture is now proceeding on a small fragment of civilian truck and bus output along with its pressing military commitments.

Ohio Crankshaft Co. expects to do a landoffice business after the war on its Tocco induction heating units. In chinks of spare time which have developed between production of great numbers of such machines for shell and other military manufacture—projects, incidentally, which have been sharply stepped up in recent weeks—experimentation has proceeded on a variety of applications for civilian use.

Perhaps the most interesting of these is the proposed use of Tocco heating machines for preheating in forge shops. Officials maintain that their machines will all but entirely eliminate the need for heating furnaces at the forges, and so will improve working conditions immeasurably. It might be said that at least one auto company is considering replacing its forge shop furnaces after the war with induction heating units, and if such a move becomes a general trend, then Ohio Crankshaft will be busily engaged. Other applications are also being studied by the company, and if these come to fruition they may provide interesting news in the future.

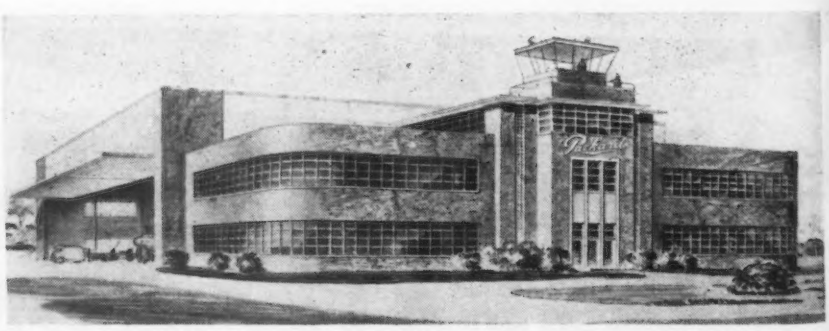
THE Cleveland plant of Aluminum Co. of America provided some interesting predictions on postwar applications of light metals, all somewhat more solidly grounded in experience and development work than most of the discussion on the subject.

Frank Jardine, now in charge of development for the company at Cleveland, exhibited test parts on a variety of automotive components. The considerable work being done by Alcoa on wheels may prove a challenge for the steel wheel makers, even though Detroiters maintain that costs of light metal of qualified physicals now appears to preclude any shift. One Alcoa disk wheel starts as a casting formed like a big kettle, on which machining leaves a flanged rim and circular body—obviously an extremely economical product to manufacture. Another type, designed for use with a bolted rim, is cast in permanent mold. There were a number of smaller parts of aluminum shown as well. One, a connecting rod, is formed from an aluminum blank with two hammer blows. It was pointed out at every turn in the discussion of such items that production economy might compensate completely for greater cost of material.

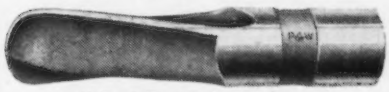
Warner & Swasey used the occasion to remove wraps from a new type of machine, the Electro Cycle Turret Lathe, whose operation is completely automatic except for loading and unloading of work. This machine's details will be announced shortly after the first of the year, following finalizing of design.

In the prototype model, visitors watched the machining of a brass billet whose diameter was reduced in three steps and threaded inside and

PACKARD RESEARCH: *For permanent flight research facilities in the aircraft engine field Packard will build this testing laboratory at Willow Run Field, in Michigan.*



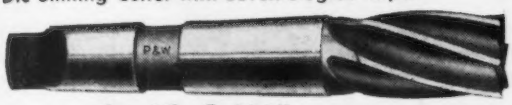
Helical Plain Milling Cutter



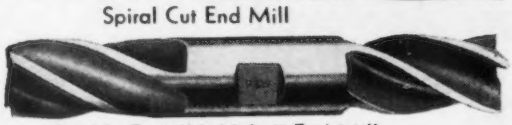
Ball End Die Sinking Cutter

Square End Die Sinking Cutter

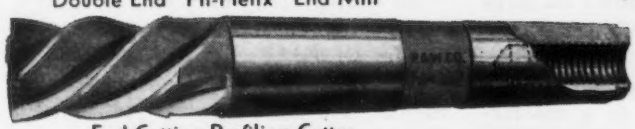
Die Sinking Cutter with Seven Degree Taper



Spiral Cut End Mill

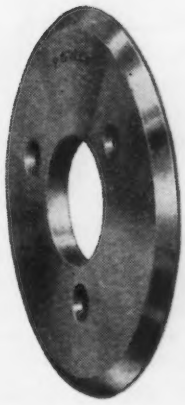


Double End "Hi-Helix" End Mill

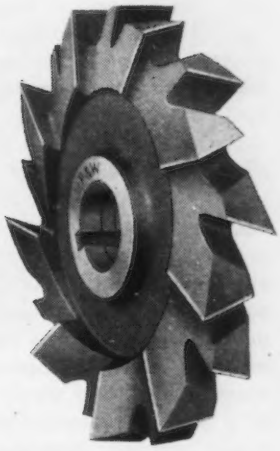


End-Cutting Profiling Cutter

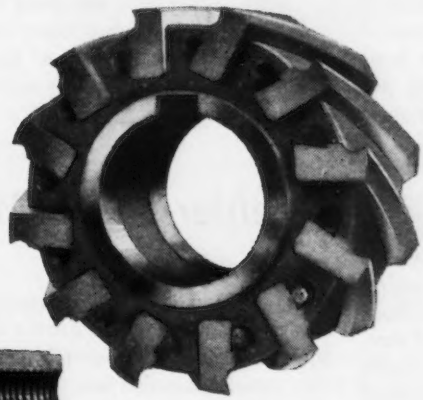
Heavy Duty Plain Milling Cutter



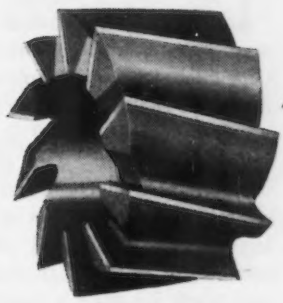
Rotary Slitting Disc



Staggered Tooth Side Milling Cutter



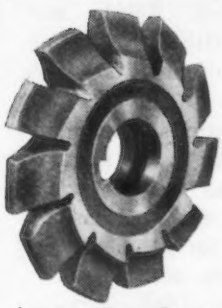
Inserted Blade Milling Cutter



Shell End Mill

P&W CUTTERS
. . FOR EVERY PURPOSE

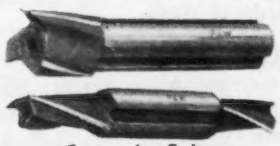
Multiple Thread Milling Cutter (Shank Type)



Involute Gear Cutter

The sample of Pratt & Whitney cutters shown here illustrates the wide range of cutters in the P&W line. With quality and analysis of the steels used controlled by a thoroughly equipped metallurgical department . . . with accuracy a constant guide . . . P&W cutters are known for their efficiency and long life. Experience has proved that for low cost, trouble-free production, there is no better investment than P&W cutters. Write for complete listings and prices.

Multiple Thread Milling Cutter (Shell Type)

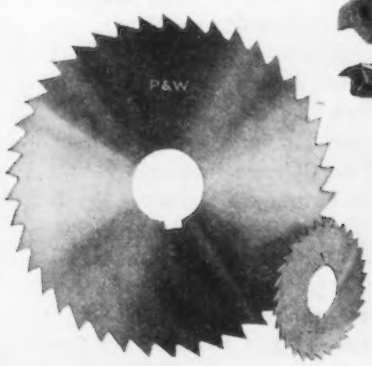


Cutters for Spline Milling Machine

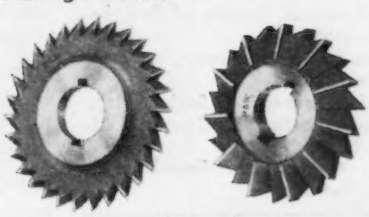
PRATT & WHITNEY

Division Niles-Bement-Pond Company

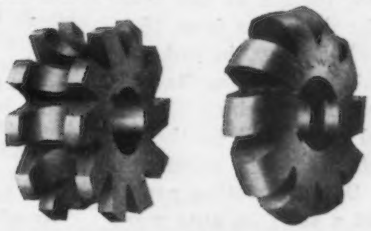
WEST HARTFORD 1 • CONNECTICUT



Metal Slitting Saws



Thread Milling Cutters



Concave and Convex Cutters

out at the small end, nine carbide cutters being used. Impromptu stop watch checking established that hand control of speeds and tap reversal for backout finished the piece in average time of 45 sec. The presetting of speeds and reversals, made possible by the new features of the machine, reduced that time to a 30 sec. average; and instant stopping made it possible to thread flush to the shoulder without risking tap breakage. It might be added that the 45 sec. cycle of the manual operation was really an ideal condition, with the operator working much faster than would be expected in a shop. Comparative shop time would probably improve the 33 per cent advantage of the new automatic operation.

THOMPSON AIRCRAFT PRODUCTS CO. showed a few postwar parts developments of interest. One such is a quick uncoupling union designed for use on oil, gas or air lines where an instant seal is desired during uncoupling. The piece is built around a 2-piece, pierced spherical chamber whose axis is at right angles to the feed line and which can be turned 90 deg. to uncouple the line and block its ends simultaneously.

Thompson also displayed a tappet valve which revolves a fraction of a turn with each opening. It is now installed on one war engine, and is expected to find a place in more expensive postwar automobile powerplants. It makes use of the torsional effect of the valve spring; as the valve rises, contact between spring and retainer lock and ball race at the bottom is momentarily broken, permitting reestablishment at a new point, so indexing the part slightly. The action of this constant turning is said to keep the valve cleaner than would otherwise be possible. Doubled life between grinds is claimed.

At Cleveland Graphite Bronze Co., plans were unfolded for manufacture of automobile bearings which will be able to withstand triple the load of prewar bearings, to meet ultimate postwar requirements. Copper-lead bearings are expected by company officials to be the favored installation. Orders are now on file at the company, calling for deliveries from 15 to 45 days after V-E Day, in order to start subassemblies down the line before final assembly begins. Availability of steel alone will be the determining factor in this company's reconversion. One interesting aspect of plans is that a start on auto work after European victory, while Pacific war requirements continue, will mean that employment will momentarily rise about 500 from its present levels.

The Weatherhead Co., producer of automobile fittings, indicated it may move into the machine tool field after the war with equipment it is developing for its own use. Weatherhead's thinking is that it will likely meet competition on brass and copper fittings from war-established newcomers; and that one answer to this competition may lie in substituting steel, a much cheaper material. In the past, however, steel has required so much more machining time that its 1-to-5 cost advantage has been dissipated. By development of faster automatics, however, Weatherhead hopes to overcome this problem. Details of its ideas are still locked up in its research rooms, but it obviously believes it has an ace or two in the hole.

The company also feels that its automotive customers may widen their use of pneumatic controls, thus expanding the market for the broad range of small screw machine pieces and others in whose output the company specializes. Pneumatic controls for window lifts and windshield wipers are seen possible. Weatherhead's belief in air as a motivating means is quite evident in its plants: it has been substituted for hydraulic control of many of its machine tools.

Doehler-Jarvis Merger Approved

Toledo

• • • **Stockholders** of Doehler Die Casting Co. and W. B. Jarvis Co. have approved a proposal to consolidate the two concerns into the Doehler-Jarvis Corp. Jarvis stockholders will exchange their shares, on a one-for-one basis, in the new company, while Doehler stockholders will receive two and one-half shares of the new stock for each one they hold.

Merger of the two companies, recommended by the board of directors of each, provides the automobile industry with its largest independent die casting and finishing facility. Doehler is the largest independent die casting company in the world. Jarvis is the largest independent supplier of automobile hardware, and has purchased the bulk of its rough die casting in the past from Doehler.

An integrated die casting and finishing operation will likely be set up in Grand Rapids. At present Jarvis operates two plants at Grand Rapids, one its hardware plant and the other for production of armor plate for tanks and other combat vehicles. Facilities in the latter plant are owned by the government, but the factory itself belongs to the company. It is contemplated that once these facilities are moved out Doehler will shift some of its die casting equipment into the building and set up a complete unit for the Jarvis finishing plant, eliminating shipment of castings between Toledo and Grand Rapids. Other operating economies of similar nature are also anticipated.

Doehler manufactures aluminum and magnesium castings for aircraft parts at present, as well as brass castings. In the past the automobile industry accounted for about 40 per cent of its production, outlets including General Motors, Ford, Chrysler and others. Sales in other directions were to household appliance, electrical instrument, store and office equipment manufacturers. It has plants at Toledo, Batavia, N. Y.; Pottstown, Pa., and a new operation started at Chicago late last year.

Jarvis customers include Chrysler, Ford, Hudson, Nash, Packard, Cadillac, Checker Cab, and others. Its hardware, produced from die castings or brass stampings, also is sold to the Crane Co. and to Standard Sanitary.

COMING EVENTS

Jan. 8-12—SAE Annual War Engineering Meeting, Detroit.

Jan. 10-11—Institute of Scrap Iron & Steel, Inc., annual meeting, Cincinnati.

Jan. 24—18th Annual Mining Institute of the College of Mines, University of Washington, Seattle.

Jan. 24-26—National Screw Machine Products Association, annual meeting, Milwaukee.

March 19-20—American Society of Tool Engineers, Cleveland.

March 19-22—Machine and Tool Progress Exposition, American Society of Tool Engineers, Cleveland.

April 4-6—SAE National Aeronautic Meeting, New York.

April 12-14—Electrochemical Society, Inc., Philadelphia—Atlantic City Congress, Atlantic City, N. J.

April 30-May 4—American Foundrymen's Association, Detroit.

Quick Answers

to Tool Steel Heat Treating Questions

One of the determining factors in successful tool performance is the final heat treatment. The best way to get maximum production results out of your tools is to be sure that your heat treating procedures are correct.

Carpenter's new Heat Treating Guide was developed to help you trouble-shoot on heat treating jobs. Its compact tabulation tells you what you want to know at a glance — its handy slide chart form makes this information instantly available.

The Guide gives for each Matched Tool Steel:

Type analysis
Forging heat
Normalizing heat
Annealing treatment
Hardening treatment
Recommended drawing range

It specifies temperatures and procedures. Operating tips are given on quenching, how to estimate oxidizing atmospheres, heating time and heating speed for drawing. Important information on the effect of drawing temperatures on hardness is presented in a new manner which shows the hardness for different drawing temperatures.

Just as Carpenter Matched Tool Steels enable the tool steel user to get maximum results in the selection of the proper tool steel, the specific hardening data of the Heat Treating Guide enables the heat treater to get maximum hardening results. Just fill in the coupon and mail it to us or write on your company letterhead for your Heat Treating Guide. (Free to tool steel users in the U. S. A.)

Mail

THE CARPENTER STEEL COMPANY
121 W. Bern St., Reading, Pa.

Please send me free, and without obligation, the new Carpenter Tool Steel Heat Treating Guide.

NAME.....TITLE.....

COMPANY.....

STREET.....

CITY.....ZONE.....STATE.....

(PLEASE PRINT)

Carpenter
MATCHED
TOOL STEELS

Washington . . . L. W. MOFFETT

• Through October unauthorized absenteeism has cost 95,000,000 man days of idleness in munitions industries . . . If sick leave were included it may run to 190,000,000 man days for 1944.

WASHINGTON—Through October of this year absenteeism has cost 95,000,000 man days of unauthorized idleness in munitions industries, (excluding strikes, sick leave, or paid vacations) according to an average of absentee rates computed in a sampling of about 25 war industries by the Bureau of Labor Statistics. Absenteeism for the 10,000,000 man labor force in munitions industries, if sick leave is included on this basis may reach the amazing total of 190,000,000 man days in 1944, or 6.46 per cent of the total working time.

Allowing 2½ per cent for sickness from the 6.46 per cent absentee rate, it can be shown from the foregoing that workers in the munitions industry could have each taken a total of 11.88 days leave which were unaccounted for by strikes, paid vacations, sick leave, or absence caused by industrial accidents, (total working time based on 300 days in year.)

October, the latest month for which BLS statistics are available, showed absentee rates for selected munitions industries as follows:

*Rate	Industry
5.5	Guns
6.2	Tanks
6.7	Ammunition
5.2	Fire Control
5.0	Fire Arms
5.1	Small Arms
6.3	Explosives
4.1	Petroleum Refining
6.5	Miscellaneous Iron and Steel
4.3	Blast Furnaces, Steel Works and Rolling Mills
7.3	Ferrous Foundries
6.6	Steel Forgings
5.7	Screw Machine
6.3	Smelting and Refining of Non-Ferrous Metals
5.8	Non-Ferrous Foundries
6.7	Miscellaneous Machinery
5.7	Engineer Equipment
5.3	Metalworking Machinery
5.8	Electrical Machinery
6.0	Radio and Communications Equipment
5.7	Airframes
5.9	Aircraft Engines
5.7	Propellers
6.3	Aircraft Parts
8.2	Shipbuilding
6.3	Automotive
6.1	Instruments and Optical Equipment

6.2 Average

*Per cent of working time idle

If the statistics were left unexplained, a shocking situation would be revealed which should require the greatest concentration by government, labor and industry to examine into the reasons for and if possible remove the causes of unauthorized leave. However, even upon explanation, absenteeism still remains a serious riddle which has undoubtedly contributed to production lags complained about by the Services, the War Department says.

In the collection of figures by the Bureau of Labor Statistics, every attempt has been made to get accurate and uniform reports from industry, but these reports contain a percentage of error on the high side because of lack of uniformity in reporting, it is felt. Some companies report men absent for a number of days when they have quit but have not notified their employers, for instance.

And although, projecting the average of a chosen cross-section over a larger segment of industry is sanctioned by recognized statistical methods, a margin of error of an unknown degree is bound to creep into any such calculations.

Still it is known that absenteeism is high—probably a great deal higher than in peacetime, but to assay its true degree, importance and the best ways to cope with it requires more investigation than either government or management and labor have yet made.

Labor Department officials say that bad weather is one cause of absenteeism on outside jobs. Women are said to cause a great deal of absenteeism because many have conflicting home duties and are not as emotionally stable as men. Further it is said, women take more time from work because of sickness than men.

Rationing of food was the direct cause of some unauthorized leave, when workers left plants to search the stores for home staples put under rationing control by OPA. Housing scarcity and poor housing is also a contributing cause, War and Labor Department officials think. One official thought that the cigarette shortage may have caused workers to take off for relatively short periods of time.

Fatigue both mental and physical

ANTI-TANK GUN: *New British self-propelled 3-in. anti-tank gun designated the Mark X, is built on the general lines of a General Sherman tank. It will be used by British and Canadian troops.*

WHAT DOES IT COST YOU to Unload a Truck?

AMERICAN MONORAIL
Saves **THIS COMPANY $20**
ON EVERY TRUCK UNLOADED

MOTORIZE *with* **MONORAIL** *for*

Faster Handling
Accurate Spotting
Reduced Fatigue
Added Safety
Automatic Operation
Finger-tip Control
Fits Any Overhead Track with smooth bottom flange.

● Former time to unload a 16-ton capacity truck was 30 manhours — with American MonoRail Motorized Equipment on the job it now takes only 2 manhours. This results in a saving of twenty-eight manhours per truck.

More trucks are now unloaded with same docking facilities. Stock is automatically handled from truck, to storage, to machines, resulting in increased storage capacity, no damage to metal and quicker, more efficient handling from storage to machine.

Costs are always reduced in direct proportion to the number of manhours saved. Let an American MonoRail Engineer show you how it can be done in your plant.

SEND FOR BULLETIN C-1.
A 56 page book showing successful applications of American MonoRail Systems

THE AMERICAN MONORAIL CO.

13103 ATHENS AVE. - CLEVELAND 7, OHIO

incurred in long hours of work in mechanical operations may have caused employees to absent themselves as a sort of precautionary physical safety valve to prevent becoming ill, it is thought. Bad employee morale because of unsafe or unsanitary working conditions, is thought to be another reason for employees absenting themselves without permission. Bad employee morale because of unpleasant relations with management is thought to be another important reason.

The percentage of absenteeism caused by drinking-bouts and resultant hangovers, plain laziness, and a lack of appreciation of the importance of work to war's winning, thinking that the "war is just about over," or failure to realize that "there's a war on" is generally thought to be overestimated. These employee failures unquestionably cause some absenteeism, but a minor part of it, government officials think.

Unions could do a great deal to improve work attendance by assuming responsibility of finding out the reasons for absenteeism and bringing workers and management together to remove causes wherever possible.

While combat films showing American casualties, and the pleas of returned veterans illustrate to workers the gravity of the war, it is felt that the average worker has an awareness of all these things, and that nagging and haranguing the majority of employees who have good attendance records only sets up a revulsion against what they consider unneeded propaganda in behalf of patriotism.

This points up the fact, BLS and WPB officials think, that high absentee rates are caused by a minority of chronic offenders, who because of apathy or laxness bring criticism down on the heads of all working men. BLS officials say they do not think that every munitions employee will have taken off about 12 days this year, but that a particular group in every plant has gone AWOL much more time than this individually.

Critical shortages in war production could be helped much if the cures for absenteeism could be applied to the offending groups of employees. Union discipline could jack-up the individuals responsible, wherever unions exist. Company cooperation in removing as many causes as companies can control would be of great help. Individual conscience, of course, is the best of all solutions to the problem.

* * *

Turnover, though, is getting the real blame for production shortages. The present turnover rate is thought to be about seven per cent a month. This means on an annual basis that 8,400,000 separate hirings are necessary to maintain the 10,000,000 munition worker labor force at full strength.

This is another story of a chronically offending minority—about 15 to 20 per cent of the workers one labor source claims. If 20 per cent of the workers are causing all the turnover, this means that 200,000 employees of the 10,000,000 are responsible for the 8,400,000 separate hirings and held an average of 42 jobs a year a piece.

This seems incredible and a curbstone opinion is that 40 per cent of all workers are more likely responsible in the main. It is estimated that those employed from one to six months are more likely to quit or be fired than any other single group.

Turnover is made up of voluntary and involuntary separations and was only about ½ per cent a month in peacetime. The high rate is attributed more to prosperity than a general desire for postwar job security. Workers, usual reasons for leaving jobs in war time would have been considered praiseworthy in peacetime—they leave for more money, a better shift or working conditions, labor officials say.

THE BULL OF THE WOODS BY J. R. WILLIAMS

THE BULL OF THE WOODS MAKES ME NERVOUS WITH THOSE DARK GLASSES--I GET THE FEELING THAT HE'S LOOKING RIGHT AT ME, BUT FOR ALL I KNOW HE MIGHT BE ASLEEP!
THAT'S JUST IT! EVERYBODY FEELS THE SAME WAY! HE CAN'T WATCH EVERYBODY AT ONCE, BUT WITH THOSE THINGS ON HE DON'T HAVE TO!
I UNDERSTAND THE OCULIST TOLD HIM HE JUST HAD TO WEAR 'EM A WEEK, BUT DURING THAT WEEK PRODUCTION WENT UP SO MUCH THAT HE FIGURED HE'D BE A FOOL TO TAKE 'EM OFF!
THE GUILTY CONSCIENCES
J.R WILLIAMS 12-22
T. M. REG. U. S. PAT. OFF.
COPR. 1944 BY NEA SERVICE, INC.

November Spending For War Declines

Washington

• • • **United States war** expenditures during November amounted to $7,095,000,000, a decrease of $352,000,000 compared to October expenditures, or 4.7 per cent, according to figures compiled by the Department of the Treasury and announced by the War Production Board recently. November expenditures for war purposes were the lowest for any month this year.

The rate of war expenditures per day averaged $272,900,000 in November compared to $286,400,000 in October. The daily rate is based on the number of days in each month upon which checks were cleared by the Treasury.

The Government has expended $236,700,000,000 for war purposes during the period July 1, 1940 through November 30, 1944. Expenditures during the period January 1, 1941 through November 30, 1944, totaled $234,800,000,000.

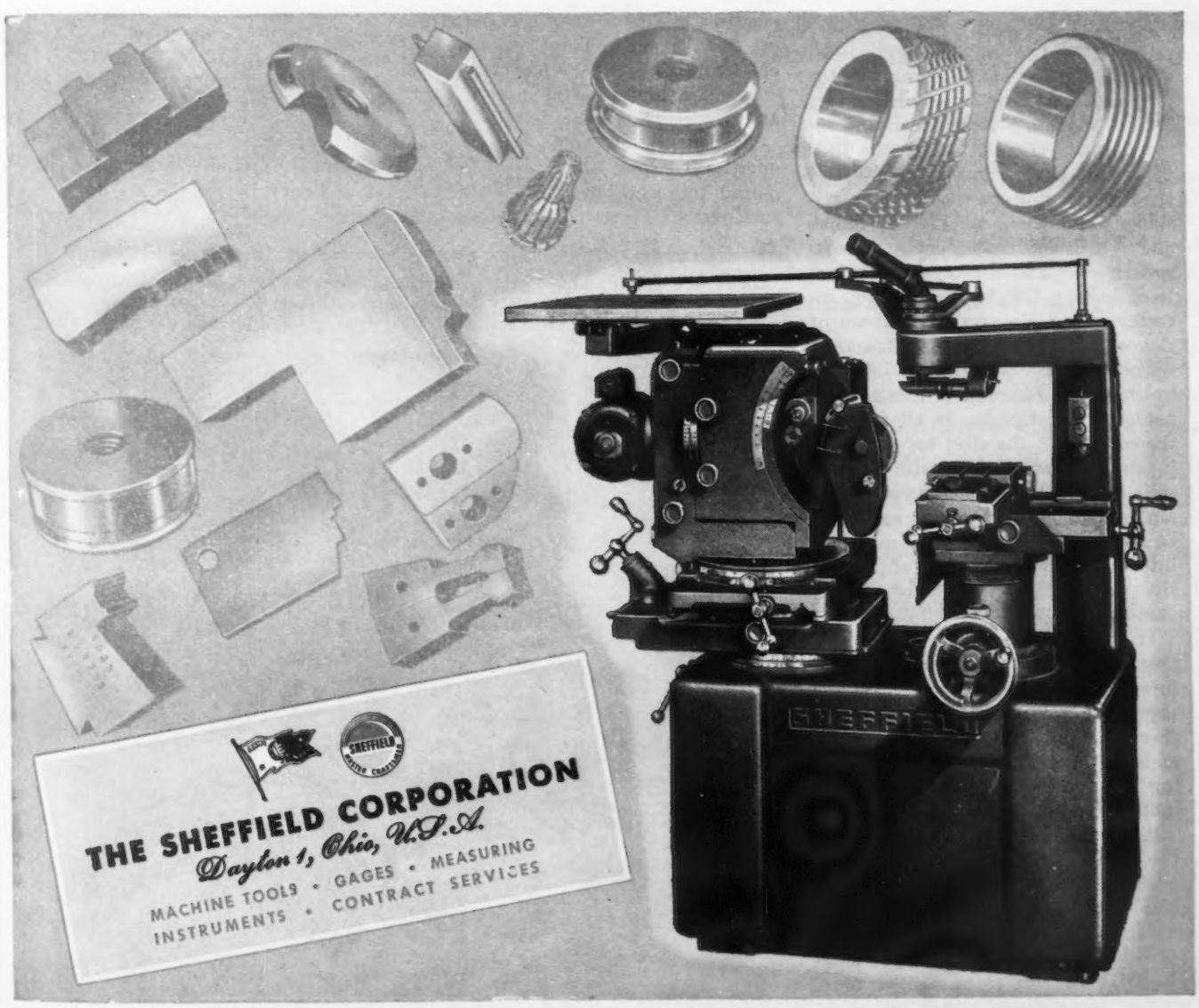
These figures include checks cleared by the Treasury and payable from war appropriations, and net outlays of the Reconstruction Finance Corporation and its subsidiaries.

The SHEFFIELD MICRO-FORM GRINDER

PRODUCES PRECISION PROFILES *Faster* **AND AT** *Lower Cost*

1. No templates required
2. Produces profiles with time saving up to 75%
3. Work is checked without removing from machine
4. Uses standard inexpensive wheels
5. Wheels require no special dressing

Grinds materials of any hardness including tungsten carbide.
Produces forms to an accuracy of .0003".

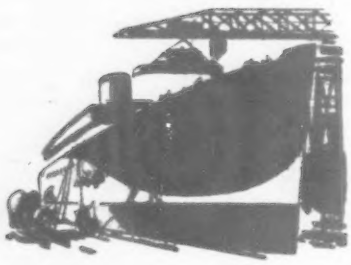


THE SHEFFIELD CORPORATION
Dayton 1, Ohio, U.S.A.
MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

West Coast . .

OSGOOD MURDOCK

• Dr. Mahoney submits the facts on possible additions at Geneva to produce sheets and tin plate . . . General Arnold and "Cap" Krug personally investigate aircraft manpower problems in Pacific Southwest.



SAN FRANCISCO—Up above the coal smoke smudge which hovers over the otherwise clean and attractive city of Salt Lake is the University of Utah, right at the base of the towering and spectacular Wasatch Range, and there works and thinks and studies a conscientious, soft-spoken, dispassionate yet tenacious Irish savant, Dr. J. R. Mahoney, director of the University's Bureau of Economics and Business Research. By painstaking, thoughtful study and by practical research combined with personal investigation in all parts of the country in the steel industry and in tireless conferences with leading steel men, he has become a recognized authority on steel operation as it may be applied to the Geneva plant to fit into the postwar economy of the entire empire west of the Rocky Mountains.

It is his reasonable and logical thesis that basic facts and essential information should be understood and accepted, first in the Far West and then nationally, in order to help clear at least part of the confusion involving the postwar problem of heavy industry in the Pacific area.

At present and for war necessity, the Geneva plant includes 252 by-product coke ovens, three 1100-ton blast furnaces, nine 225-ton open hearth furnaces, a 45-in. slabbing and blooming mill, a 132-in. four-stand continuous plate mill, a 26-in. structural mill and complementary facilities. Plate capacity, annually, is approximately 700,000 net tons and structural shapes, billets and rounds approximately 200,000 tons in addition.

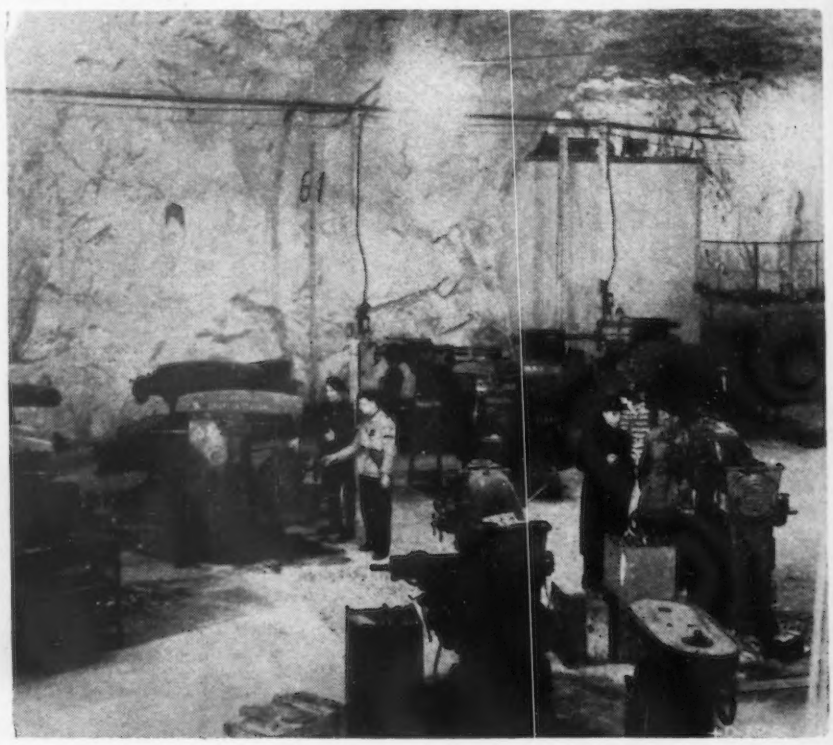
With additional equipment to cost approximately $4,000,000, two additional finishing stands of rolls and two coiling machines could be added in the postwar period so that a six stand finishing train could produce strip and sheets as well as plate. Average annual rated capacity of the 28 continuous wide strip mills that have been built in the United States is 630,000 tons (in actual practice many units have produced at a rate in excess of 1,000,000 tons a year). The smallest is 326,000 tons and the largest 940,000 tons. Thus the capacity of Geneva is quite in harmony with continuous mills that have been built and are operating successfully.

To produce tin plate, considerable additional expenditure would be required for a cold reduction mill and continuous tin coating facilities. The usual annual capacity of tin plate finishing is between 200,000 and 400,000 tons which, incidentally, is the normal market for and consumption of tin plate in the area west of the Rocky Mountains. There is now no continuous strip mill west of the Mississippi and no tin plate facilities of any kind or sort. Up until a few years ago Columbia Steel Co. produced approximately 30,000 tons of tin plate a year at Pittsburg, Cal., on a hand mill, but this equipment has now been dismantled and the building and facilities devoted to other purposes.

Apart from the uncertain problem of markets and economics and cost, Dr. Mahoney insists that those interested should understand the facts bearing on the practical mill facilities required for the various products involved.

Following close on the heels of General Knudsen two weeks ago, Gen. Henry H. Arnold, the four star commander of the Army Air Forces

CAVERN SHOP: *Additional underground aircraft shops have been discovered in France, built while that country was being heavily bombed before D-Day. This cave covers half a million feet of floor space, all inside a limestone hill.*



Fish Story

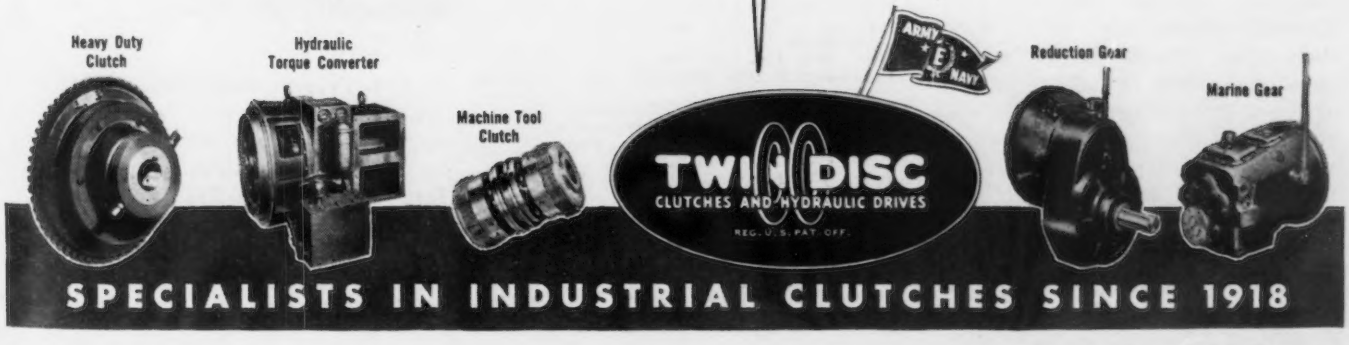
WITHOUT A FINISH

If tuna, halibut and other denizens of the deep list their public enemies, this man probably is No. 1. The fishing boat he skippers consistently brings in prize catches—and that's no accident. Since his first time out with a fishing fleet, no trip has failed to teach him something. Even now—years later—the skipper makes each new experience work for him, to make each succeeding effort produce more.

More than 26 years ago, the Twin Disc Clutch Company also formed the habit of putting experience to work in designing and manufacturing industrial power links, or clutches. Today—you, as a clutch user, can profit from this habit.

First, let Twin Disc's broad *application* experience help you decide what kind of power link you need. Then take advantage of our intimate knowledge of the best ways to build such a clutch. Finally, relax in the assurance that—with our nation-wide system of parts depots and factory branches—replacement parts are never more than a few hours from your job.

You can make money with that simple formula—just as countless users of Twin Disc Clutches and Hydraulic Drives already have done. For a starter, why not write us now concerning the power links for the machines you will soon be building? Remember that the right kind of power transmission and control can add far more than their own cost to the value of a machine. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



and "Cap." J. A. Krug, the forthright, level-headed chairman of the War Production Board, have spent the past week in southern California, visiting air craft plants, talking with leaders of industry and making first-hand studies of lagging manpower and production problem, especially in heavy bomber production. "Getting back to the war plant job and staying on the job is the great responsibility of every worker who has left such a job on the mistaken assumption that war is almost over," declared "Cap." Krug after he had familiarized himself with Douglas Aircraft's needs. "The war effort is in a manpower jam because so many war workers have gone into non-essential industries. Many of them, including particularly women who went to work in war plants out of patriotism, have been led to believe the emergency is over. Turnover trends show higher job terminations and absentee rates these past few months than ever before."

General Arnold ascertained that in the first 10 months of this year, 177,649 persons quit 10 plants on the Pacific Coast alone. Some 109,916 were hired in this period, with a net loss of 68,733 workers. There are neither housing, transportation nor general food and service facilities for great numbers of imported workers. The problem is to get available resident persons with past experience to return to their jobs and stay with them.

On four major types of aircraft Consolidated Vultee is up to only 75 per cent of scheduled production on one, up to 90 per cent on another and up to 95 per cent on a third. On the fourth the company has not yet been able to make a start because of the shortage of production workers.

Charges of "arbitrary" downgrading and misapplication of wage classifications have been made by the three principal aircraft unions, CIO United Auto Workers, AFL International Association of Machinists and the independent United Aircraft Welders of America, in a petition filed with WLB and the West Coast Aircraft Committee. The unions claim that "hundreds of workers have been driven out of the industry by low wages as compared with shipyards and other plants, a cumbersome and complicated rate range, low starting rate and unsatisfactory merit system." Changes in production schedules and switches to different models this summer caused layoffs and quits, the effect of which it has been difficult to overcome. It is reported that Douglas will want 4500 more workers at Santa Monica and 10,000 at Long Beach during the next six months, Lockheed needs 1600 now and that North American, Northrup and Convair are correspondingly shorthanded.

* * *

Henry Kaiser's unpredictable hand again stirred up the cement industry when Permanente Cement Works unexpectedly reduced its prices by 20 cents a barrel, in defiance of recent increases by southern California producers. Permanente's new price is $1.75 a barrel, sacked, and $1.46 a barrel, bulk, at the Permanente plant. The Kaiser management stated that the 12 per cent reduction was to stimulate postwar building and construction activity and to dispel inflationary tendencies. Outsiders hinted some competitive angle may be involved.

* * *

Priorities have been granted for construction of a low temperature char pilot plant at the Fontana mill of Kaiser Co., Inc. Equipment and installation will be under the direction of Pittsburgh Coal Carbonization Co. whose president, C. E. Lesher, visited the Fontana works recently.

* * *

Gross revenue from the sale of hydro-electric power developed at the Federal Bonneville and Grand Coulee dams has exceeded $50,000,000 for the five years since the energization of the first Bonneville high-voltage transmission line. This revenue represented the sale of more than 21 billion kw.-hr. of power. The Administration reports that a net surplus in excess of $12,000,000 has been accumulated "after payment of all power costs, operation and maintenance expenses, depreciation and interest on the Federal investment in the Bonneville-Grand Coulee transmission grid and power facilities at the two Columbia River plants."

* * *

At Dallas North American Aviation, Inc., will shortly start asembling a new type cargo ship designed by another company. The plant will continue to build P-51 Mustangs and AT-6 Texans. The Kansas City plant will undertake a major sub-contract in connection with the new ship in addition to its present B-25 program. Now it can be told that P-51 Mustang single engine fighters develop a speed of 450 miles an hour, believed to be the world's fastest propeller-driven airplane.

* * *

Consolidated Steel Co. has been authorized to spend $75,500 on reconstruction at the Ackerman yard at Newport Beach which it recently acquired. There they will make steel tuna clippers and car floats and tugs for the Santa Fe Railroad to use on its freight car ferries across San Francisco Bay.

* * *

Ryan Aeronautical Co. has started a $1,000,000 expansion program at its San Diego plant to provide additional facilities for the production of over $60,000,000 of Navy planes recently contracted.

Cited for Awards

• • • **The following companies** have received the Army-Navy "E" for outstanding war production:

American Hardware Corp., P. & F. Corbin Co., New Britain, Conn.
Armstrong Cork Co., Beaver Falls, Pa.
Atlantic Calsomine Co., Brooklyn.
Automatic Radio Mfg. Co., Inc., Boston.
Bloomington Limestone Corp., Cline & Wylie Mills, Bloomington, Ind.
Boston Machine Works Co., Lynn, Mass.
Cayuga Motors Corp., Ithaca, N. Y.
Conley Frog & Switch Co., Forge Plant, Memphis, Tenn.
E. I. du Pont de Nemours & Co., Fairfield, Conn.
A. H. DuGrenier, Inc., Haverhill, Mass.
Everlastik Knitting Mills, Philadelphia.
Farr Co., Los Angeles.
Florence Stove Co., Gardner, Mass.
General Motors Corp., Fisher Body Division, Central Development & Experimental Unit, Plant No. 21; Stamping Unit, Plant No. 37, Detroit.
Hooker Electrochemical Co., Tacoma, Wash.
Lamb-Grays Harbor Co., Plant No. 1, Hoquiam, Wash.
Lincoln Mfg. Co., Chicago.
National Carbon Co., Inc., Edgewater Works, Cleveland.
Nunn Mfg. Co., Evanston, Ill.
Paramount Textile Machinery Co., Kankakee, Ill.
Pinellas Lumber Co., St. Petersburg, Fla.
Porcelain Steels, Inc., Lakewood, Ohio.
"Quick-Way" Truck Shovel Co., Denver.
Reade Co., Lakehurst, N. J.
Regal Electronics Corp., Main Plant, New York.
Robertshaw Thermostat Co., Youngwood, Pa.
Scandia Mfg. Co., North Arlington, N. J.
L. R. Teeple Co., Portland, Ore.
Thompson Products, Inc., Toledo Steel Products Co., Toledo, Ohio.
United States Slicing Machine Co., LaPorte, Ind.

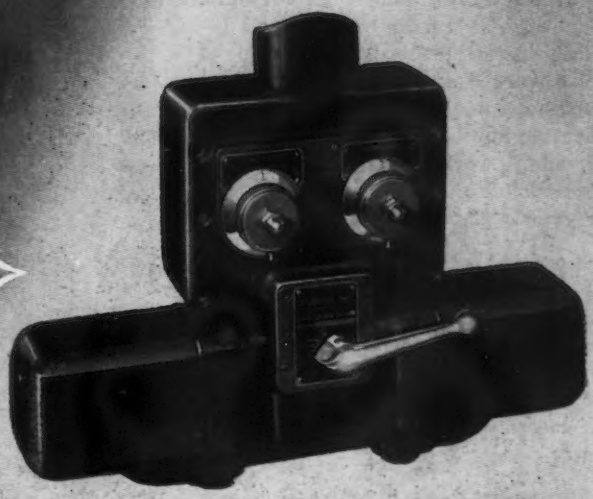
Railroad Profit Down

New York

• • • **Present indications** are that annual railroad profits in 1944 will not exceed $650,000,000 and may be less, according to Alexander Hamilton Institute. Profits in 1944 will thus be the smallest since 1941 and will be considerably smaller than the profits of $874,000,000 in 1943 and $904,000,000 in 1942.

SMOOTH and CONSTANT FEED RATE

regardless of fluctuations in work resistance or hydraulic operating pressure



Double Solenoid Type
Push-button Operation

VICKERS "Traverse and Feed Cycle" CONTROL PANELS

These panels provide self-contained, compact control units for automatic machine applications where the cycle is a combination of rapid advance, one or two feeds, and rapid return motions. The two feed rates are infinitely variable within their ranges, and adjustments can be made during feed. Applications include drilling, reaming, boring, turning, milling and swaging machinery.

The hydraulic circuit in the panel employs the well-known Vickers Flow Control Valve in a "metering-out" circuit which means a smooth and constantly maintained feed rate for any given adjustment regardless of fluctuations in cutting tool resistance or changes in hydraulic operating pressure.

Simplicity is evident from the fact that there are only two working parts that move. Many standard modifications are available; feeds can be in either direction or both directions; operation is by single or double solenoids integral with panel, separate solenoids or pilot pressure. Practically any cycle sequence can be obtained. See Bulletin 41-10 for complete information.

Vickers Application Engineers will gladly discuss with you how "hydraulics" can be used to your advantage.

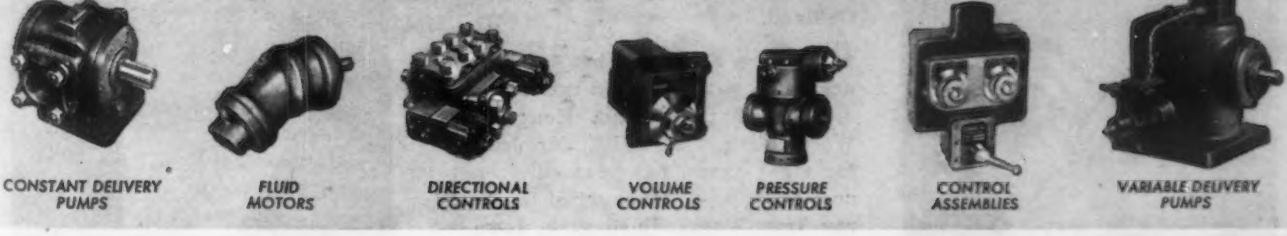
VICKERS *Incorporated*

1420 OAKMAN BLVD. • DETROIT 32, MICHIGAN

Application Engineering Offices:

CHICAGO · CINCINNATI · CLEVELAND · DETROIT · LOS ANGELES
NEWARK · PHILADELPHIA · ROCHESTER · ROCKFORD · TULSA · WORCESTER

Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function



CONSTANT DELIVERY PUMPS · FLUID MOTORS · DIRECTIONAL CONTROLS · VOLUME CONTROLS · PRESSURE CONTROLS · CONTROL ASSEMBLIES · VARIABLE DELIVERY PUMPS

PERSONALS

• **E. V. Crane** has resigned as chief of development engineering at the Brooklyn plant, E. W. Bliss Co., after an association of more than 24 years, to engage in certain confidential research investigations in the field of press worked materials. Mr. Crane's contributions to popularizing the scientific approach to the problems of the metal working art and his basic research into plastic flow phenomena are widely known.

• **Roy C. Sylvander** has been appointed director of engineering of the Bendix Aviation Corp.'s Eclipse-Pioneer Division at Bendix, N. J. Mr. Sylvander has been chief engineer of the division for the past three years. He succeeds **W. A. Reichel**, who recently resigned.

• **Marion T. Davis** has been appointed manufacturers agent for Eclipse Counterbore Co., Detroit, in southeastern United States with offices in Atlanta.

• **Carl G. de Laval**, who for the past 10 years has been connected with the Electro Metallurgical Sales Corp. has joined the Pittsburgh Alloy Corp., Pittsburgh, as vice-president in charge of sales.

• **F. Jenkins** has been appointed Chicago district sales manager, National Screw & Mfg. Co., Cleveland. Mr. Jenkins joined the company in 1926, and subsequently has worked in the production department, the general sales office, and as an outside salesman. During the war he has been in charge of government sales, and recently has been supervisor of contract terminations for the company.

GEORGE F. JENKINS, Chicago district sales manager, National Screw & Mfg. Co.

W. F. KURFESS, manager, Milwaukee plant, Joseph T. Ryerson & Son, Inc.

• **W. F. Kurfess** has been appointed manager of the Milwaukee plant of Joseph T. Ryerson & Son, Inc., Chicago, succeeding the late George W. Smith. Mr. Kurfess has been on active duty with Bureau of Ships, Navy Department, and in the Office of Procurement and Materials since September, 1941. Prior to that, he was an executive of the company in Chicago.

• **Alan Dale** has been appointed vice-president, Shook Bronze Corp., Lima, Ohio.

• **Francis M. Huffman** has been appointed traffic manager, Bethlehem Steel Co., Bethlehem, Pa. Mr. Huffman formerly assistant general traffic manager, has been associated with the company since 1922. **H. A. Ardinger, J. T. Davin** and **J. C. Howard** have been appointed assistant traffic managers, and **J. T. Hittinger** has been made assistant to the general traffic manager.

• **Hans Popper**, formerly with Commercial Metals Co., Dallas, and a former member of the OPA advisory committee for the iron and steel scrap industry, has joined the California Scrap Iron Co. with headquarters at Oakland.

• **Clarence F. Jensky** has been made head of a newly created turbine sales division of the Joshua Hendy Iron Works, Sunnyvale, Calif. Mr. Jensky, for eight years, has been chief engineer and general manager of the Murray Iron Works, Burlington, Iowa.

• **Paul E. Hovgard** has been appointed associate director of the research laboratory, Airplane Division, Curtiss-Wright Corp., Buffalo. Mr. Hovgard came to Curtiss from the Glenn L. Martin Co., for whom he was chief research engineer and chief designer.

• **George W. Mitsch**, since 1935 assistant manager of foundries of the Madison and St. Louis plants, American Car & Foundry Co., New York, has been appointed operating manager of foundries, assuming operational management of all a.c.f. foundries.

• **Charles E. Spenser**, formerly president of the California Steel Co., and for the past 13 years with the Bethlehem Steel Co., Bethlehem, Pa., as a sales executive in the fabricating department, has retired.

• **Robert H. Shenk** has been appointed administrative engineer in charge of research and development, **J. A. Zurn Mfg. Co., Erie, Pa.**, and **Bernard Alexander** has joined the organization as sales representative in the midwestern territory with headquarters in Chicago. **Harold Bergman**, formerly connected with the Chicago office, has joined the promotional and advertising department in Erie.

• **Fred W. Dixon, Jr.** has joined the Cleveland Foundry Co., Cleveland, as salesmanager. Prior to his present position, Mr. Dixon served more than 12 years as sales engineer and assistant sales manager of the Gunite Foundry, Rockford, Ill.

FRED W. DIXON, JR., sales manager, Cleveland Foundry Co.

• **Milton Annich** has been appointed superintendent of standards for all nine divisions of the American Brake Shoe Co., New York. Mr. Annich rejoined the organization after nearly two years service with the Army.

• **Albert H. Shonkwiler,** former superintendent of Bethlehem Steel Co.'s strip mill at Lackawanna, has become assistant to the general manager of the plant, succeeding **George W. Whitehead,** who has retired after 44 years in the steel industry. Before coming to Bethlehem in 1936, Mr. Shonkwiler was general superintendent for the Otis Steel Co., and had been superintendent of the Wheeling Steel Co.'s strip mill at Wheeling, W. Va.

• **H. H. Whittingham,** formerly vice-president in charge of engineering of the Norge and Detroit Gear Aircraft Parts Divisions, Borg-Warner Corp., Chicago, has been appointed vice-president and manager of the latter unit. **Ira H. Reindel,** Norge chief engineer has been promoted to director of Norge engineering.

• **E. H. Thorsteinson** has been elected vice-president and controller of the National Supply Co., Pittsburgh.

• **E. B. Dewey** has been appointed sales representative in southwestern and central Michigan for the Allen-Bradley Co., Milwaukee.

• **L. H. Skougor** has been appointed general manager of the production planning department, Continental Can Co., New York. Mr. Skougor was formerly manager of the company's plant in Jersey City. **E. B. Dullinger** has been appointed factory manager of the recently acquired Clearing-Owens plant in Chicago; **K. W. Houck** has been appointed industrial engineer of the same plant. **J. Fedosky, Jr.,** has been made a representative of the vice-president in charge of manufacturing. **R. J. Humes** has been appointed factory manager of the company's Wheeling, W. Va., plant; **J. M. Gibb** has resumed his former duties as assistant factory manager and master mechanic at the Oil City, Pa. plant and **Alex Gibbs** has been appointed assistant factory manager at the Continental plant at Warwood, W. Va.

• **Hamilton O. Penn** has been elected a director of the Tyson Bearing Corp., Massillon, Ohio. Mr. Penn heads the H. O. Penn Machinery Co., New York.

LEOPOLD H. P. KLOTZ, president, Luscombe Airplane Corp.

• **Leopold H. P. Klotz** has been elected president of Luscombe Airplane Corp., Trenton, N. J., succeeding **A. C. Hastings, Jr.,** retired. Mr. Klotz has been serving as vice-president and treasurer of the company. **Clarence L. Riegel,** who has been secretary and assistant treasurer, has been made secretary and treasurer.

• **J. Howard Riddle,** who has been in charge of the Rochester branch of Milcor Steel Co., Milwaukee, since 1938, has been assigned new duties in connection with special sales work in Rochester. **Frank C. Raschka** has been appointed to succeed Mr. Riddle as manager of the Rochester branch.

• **Theodore Johnson,** former secretary of the J. I. Case Co., Racine, Wis., has been appointed executive vice-president. **William B. Peters,** former treasurer, has succeeded him as secretary, and **William E. Anderson,** former assistant secretary, has been made treasurer.

• **Ross O. Laub** has been appointed superintendent of cost planning, Gary sheet and tin mill, Carnegie-Illinois Steel Corp., Pittsburgh, succeeding **C. E. Moore,** recently transferred to Pittsburgh. Mr. Laub will be replaced as plant industrial engineer by **Hans C. Andersen.**

• **Andrew Kaul III** has been elected president of the Speer Carbon Co., the International Graphite & Electrode Corp., and the Speer Resistor Corp., St. Marys, Pa.

• **Harold E. Hardenbrook** has been appointed general works engineer for all Buick plants of the Buick Motor Co., Flint, Mich., succeeding **Frank Elwell,** retired. Mr. Hardenbrook has been works engineer at the Buick Melrose Park plant.

• **Joseph M. Gwinn,** director of tooling of Consolidated Vultee Aircraft Corp., San Diego, Calif., has been appointed manager of the Stout Research Division of the company, Dearborn, Mich.

• **Antonio R. Villalba** has been appointed Caribbean regional manager for the export division, Crosley Corp., Cincinnati, with headquarters in Mexico City.

OBITUARY...

• **Bert R. Weidle,** a partner of the Weidle-Kratzer Co., Buffalo, N. Y., died suddenly November 28. Mr. Weidle had been connected with the National Malleable & Steel Co., the Michigan Malleable Iron Co., Detroit, and manager of the malleable and steel plant of the American Radiator Co. He was one of the organizers of the Lancaster Malleables & Steel Corp., Lancaster, N. Y., of which he became vice-president and general manager.

• **James D. Sample,** executive vice-president of the McWane Cast Iron Pipe Co., Birmingham, and vice-president of the Pacific States Cast Iron Pipe Co., Provo, Utah, before his retirement early in 1944, died in Birmingham, December 7. Mr. Sample was 59 years old.

• **Darius E. Peck,** since 1929 vice-president and general counsel of General Electric Co., Schenectady, N. Y., and a member of the company's advisory committee, died suddenly December 6. Mr. Peck was 67 years old.

• **Willis S. N. Waring,** collaborator in research and development of steel alloys, and technical supervisor in armament steel production at the U. S. Steel Corp.'s South Works, Chicago, died in Portland, Me., December 6.

• **Frank L. Putnam,** experimental engineer at the Reed & Prentice Co., Worcester, Mass., died December 2. He was 64 years old.

• **Edward M. Joyce, western sales manager, The Champion Rivet Co., Cleveland, died November 14.**

• **Henry G. Ellis,** president of the Torrington Mfg. Co., Torrington, Conn., died December 1.

Fatigue Cracks . . .

BY A. H. DIX

Williams' Wild Oat

• • • We have long suspected that your favorite family journal is blessed or cursed with the most responsive and critical family of readers known to that acre of the Fourth Estate occupied by industrial journalism. With no intent to boast, but merely to air a fact, we report that reader interest among you and other loving readers seems to be constantly at the flash point.

When our merest slip is marked, it is hard for us to believe that there are editors to whom a letter from a reader is as rare and tender an event as the receipt of a surreptitious caress by a D.A.R. chapter chairlady. In evidence of critical reading we offer this letter from T.C. (Michigan Seamless Tube Co.) Moran:

Does cartoonist Williams' unerring representations of machine tool parts extend to the operators' parts? In his Dec. 7 cartoon one wonders how the tall man will take care of his center of gravity at the next step.

Will he genuflect, leap, or grab hold of his fat friend?

True, the tall man has insufficient momentum to carry him to another forward step. But he may be walking backward, or our cartoonist, who renews his artistic license annually, may be using his current one just once more before it expires eleven days hence.

Monumental Monikers

I had an aunt once whose name was A. Iona Crowe.

—*Mildred McEwen, American Steel & Wire Co., Cleveland*

The chief engineer of Scully-Jones Co., Chicago, is B. Better.

—*D. R. Jefferson, General Foreman, Forge Shop, Timken Roller Bearing Co., Canton, O.*

A. J. Ohm is a designer for Markel Electric Products.

—*C. R. Maxon, New Jersey Zinc Co., New York*

For your Library of Lovely Names, how about the 95th Infantry Division's Maj. Gen. Harry Twaddle?

—*C. C. Finn, John Finn Metal Works, Seattle*

Certainly there must be room for Admiral Sir Ernest Ernle Erle Drax Plunckett.

—*I. H. Stauffer, President, Stauffer, Eshleman & Co., New Orleans*

A Bloomfield, N. J., manufacturer sends us an auction announcement of jewelry from the estate of Etta Hedden Toothe, who is elected a posthumous member of the Distinguished Name Club. A new, live member is A. Camp Streamer, Westinghouse v.p., nominated by Miss Marianna (Dayton Power & Light Co.) Stickter.

Lt. Comdr. H. C. Van Deventer, the boss' son, says if you turn to page 1507 of the Chicago telephone directry you will find this, "TINKOFF PAYSOFF, Tax Accountants."

Our Name, Their Shoes

. . . I wonder if you will be as shocked as I was when I saw the attached advertisement in "Safety Engineering."

My first thought was that our f.f.j. had gone into the shoe business. Maybe you should, if only to give H. Childs & Co. the "hotfoot" for using your name as a trademark.

—*H. W. Abbott, Director of Laboratories, Speer Carbon Co., St. Marys, Pa.*

And A. B. Farquhar Co., York, Pa., makes IRON AGE farm implements. Our knowledge of copyright law is feeble, but our guess is that our right to exclusive use of the title does not extend beyond the publication field. If, therefore, a non-competitor, say for example a perfume manufacturer, should suddenly tire of such high-tension trade names as "Shocking," "Passion," "Allure," and "Temptation," and come out with something substantial like "Iron Age Scent," all we could do would be to grind our dentures futilely. However, to discourage imitators we give below Hesiod's definition of the Iron Age:

The Age wherein toil and selfishness are the burden of a degenerate mankind.

Scent Sales Stimulant

• • • But "Iron Age" might not be a bad name for a perfume. For millions of women must eschew it in fear that what the ads say might be true; the perfume might make them unselectively devastating, leading to embarrassing situations with milkmen, mail carriers, piano tuners, and other callers.

So a solid name like "Iron Age" would appeal to the vast conservative market. As a matter of fact, the very incongruity of the title might be a sales point. Trying it would take some courage, but no more than the Whip-Mix Corporation, of Louisville, Ky., displays in printing on its letterhead "Beautiful Castings." Pulchritude and castings are rarely associated, but there is no reason why they should not be, and we herewith pat the Whip-Mix back for conspicuous imagination and dauntlessness.

King-Size Pickle Barrel

• • • Before the year is over we would like to squeeze in this observation by one of our favorite writers, Judge Learned Hand:

"The spirit of liberty is the spirit which is not too sure that it is right."

People and publications that are always right are certain to be dull and ineffectual, for the only way to avoid error is never to depart from well-worn paths. But unless an institution or a nation is to perish of dry rot, some must risk the dangers and errors that are the inevitable lot of those who hew new paths.

After delivering ourself of that profound and unoriginal thought, may we add that there are also mudholes in well-worn paths. The almost infallible *New York Times* fell on its face in one recently when it said:

With the Norden bombsight you can drop a bomb practically into a pickle barrel from a height of 10,000 ft.

The strain on "practically" is too great, for the ordinary pickle barrel is about 15-in. in diameter. As a lover of accuracy the *Times* should have said "into a 150-ft. dia. pickle barrel."

Puzzles

• • • Last week's ladder is 104.995 ft. long. It rests 32 ft. from one wall, and 68 ft. from the other.

The most popular problem of 1944 is the one about the largest number that can be expressed with five 3s. J. W. (Ingersoll-Rand) Foster, John (Tyler Fixture) Van Arman, Eric (Kaydon Engineering) Zachau, and others say 3^{3333}. Eric (Cincinnati Planer) Wang and Admiral O. L. Cox offer 3 with four 3s as ascending exponents. H. Kelsea Moore, Jr., tops them by suffixing each 3 with the factorial! Allan G. (Fred S. Gichner Iron Works) Stern offers a solution requiring four different kinds of brackets, more than we have in our type box, which prevents us from printing it.

W. H. (Hyatt Bearings) Chapman, who wrote us on Dec. 7, "I think my list showing all numbers from 1 through 37 exhausts the list of consecutive numbers expressible by five 3s," will be astonished to learn that Mr. Stern has carried the list through 100.

D. A. (Delco-Remy) Cotton sends in another ladder problem:

A wall 4 ft. high is placed 4 ft. away from the side of a house. What is the shortest ladder that will just touch the top of the wall and rest against the side of the house?

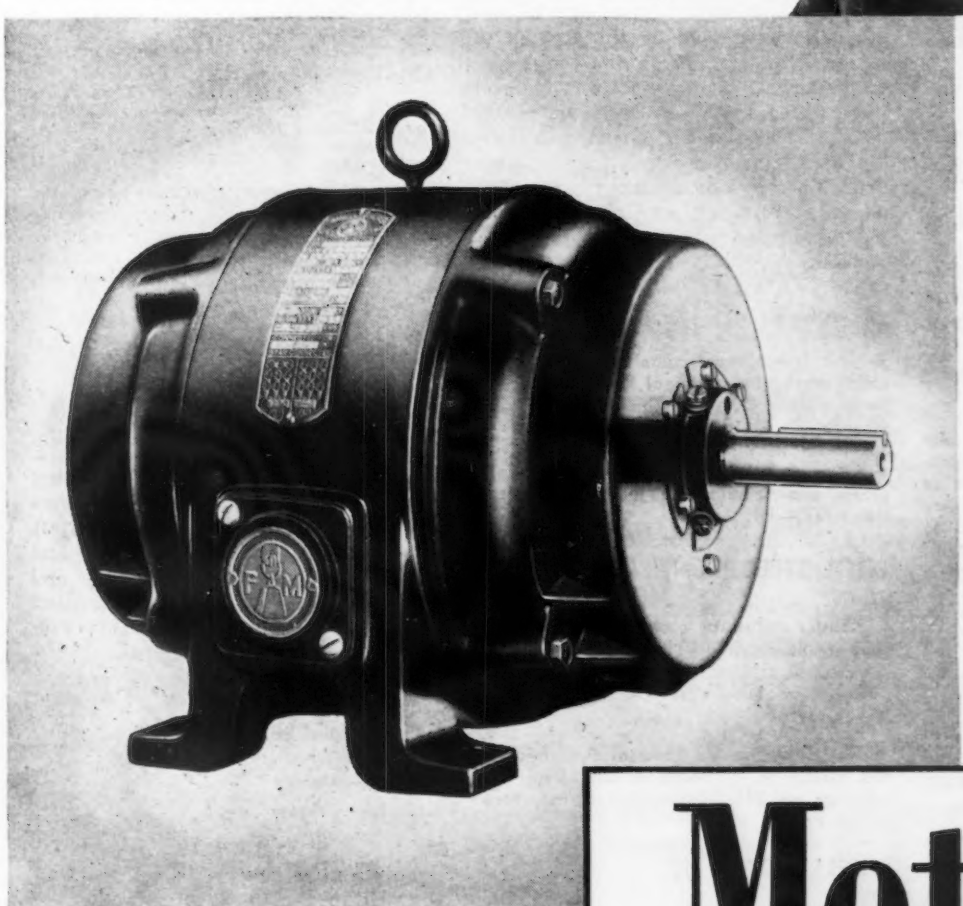
"A name worth remembering"

Fairbanks-Morse

To search constantly for ways to improve is a basic Fairbanks-Morse policy. Development work goes on continually in our research laboratories—in good years and bad, in time of peace and in time of war. During the months and years ahead this research will yield a rich harvest to users of industrial equipment.

R. W. Morse Jr.

General Sales Manager



FEATURES OF THE NEW

Fairbanks-Morse

GENERAL-PURPOSE MOTOR

- It is a 40° C. motor.
- It is a protected motor.
- It has an optional conduit box assembly.
- It has cross-flow ventilation.
- It has ball bearings, sealed in and protected.
- It has the exclusive Fairbanks-Morse *Copperspun Rotor*.

Motors

Fairbanks, Morse & Co.
Chicago 5, Illinois

Diesel Locomotives • Diesel Engines • Generators
Motors • Pumps • Scales • Magnetos
Stokers • Railroad Motor Cars and Standpipes
Farm Equipment

BUY MORE WAR BONDS

© 1944. Fairbanks, Morse & Co.

Dear Editor:

BENTON HARBOR MICH 11 1240P
THE IRON AGE 100 EAST 42 ST
SHOULD LIKE PERMISSION TO REPRINT EDITORIAL OF NOVEMBER NINE AS A NEW YEARS NEWSPAPER DISPLAY
BENTON HARBOR
CHAMBER OF COMMERCE
ARTHUR C CAHOW SECY & MGR

Sir:

Your editorial "The Empty Chair," which appeared in the Oct. 29, 1942, issue of THE IRON AGE, and in a more recent issue, has been called to my attention. I feel that this is a timely article and would like your permission to run it as an editorial in our house organ, the *Union Steel Messenger*.

MARILYN PALMITER, Editor-in-Chief
Union Steel Products Co., Albion, Mich.

● Permission granted.—Ed.

POSTWAR EARTH MOVING

Sir:

The comment in the Assembly Line for Nov. 30 about the excellent outlook for postwar earth moving equipment is of interest. Can you advise which companies might benefit from this anticipated sales volume?

S. B. LURIE
Paine, Webber, Jackson & Curtis, 745 Fifth Ave., New York

● This item was based on a survey made by J. T. Calloway, manager of field operations, manufacturers' sales department of Goodyear Tire & Rubber Co., Akron. Every firm in the industry may be expected to benefit. The list of earth moving equipment builders is too long to publish here. See a directory.

METAL POWDER SCISSORS

Sir:

Kindly let us have the names of firms manufacturing articles from powdered steel, as we wish to have some scissors blades made that way.

E. GOLDMAN
Metropolitan Cutlery Co., 33 West 34th St., New York

● Here are the names of some manufacturers of metal powder products who may be in a position to quote on the production of scissors blades: Oilite Bearing Div., Chrysler Corp., Detroit; Moraine Products Div., General Motors, Wisconsin Blvd., Dayton; Plastic Metals Inc., Johnstown, Pa.; National Molded Products, Inc., St. Marys, Pa.; and Powder Metallurgy, Inc., 43 Ave. and Crescent St., Long Island City, N. Y.—Ed.

CENTRIFUGAL CASTINGS

Sir:

The Nov. 16 News Front mentions a midwest foundry abandoning centrifugal casting because of porosity and increased machining costs.

I have been pouring gray iron centrifugally for the past ten years and while there have been difficulties to overcome, porosity and increased machining costs have been the least of our troubles. Our customers report less than one per cent loss during the processing operations with longer life in service. Surely this should speak well for centrifugal casting.

A. E. FALK, Manager
Centrifugal Casting Co., 3454 Pine Ave., Long Beach, California

● The item mentioning a foundry which had abandoned centrifugal casting because of increased machining costs and porosity terest. Generally speaking, producers have was published as a matter of general infound just the opposite to be true.—Ed.

PHOSPHOR BRONZE FLUX

Sir:

A flux developed by the British to increase the soundness and toughness of phosphor bronze is described on page 47 of the Nov. 14 issue. It is presumed the development was primarily for sand castings but it seems probable that any improvement could be adapted to chill castings which we make. Please send us further information.

T. C. MERRIMAN, Metallurgist
The Seymour Mfg. Co., Seymour, Conn.

● This development came from the laboratories of the International Tin Research and Development Council. The American representative of this committee is Battelle Memorial Institute, Columbus, Ohio. They would probably be familiar with the details of the experimental work in which you are interested.—Ed.

TOOL STEEL IDENTIFICATION

Sir:

Kindly send us a chart of colors of tool steels showing their brand names.

FRANK BERGER
Connecticut Alloy Steel Co., 7 Minor St., New Haven, Conn.

● The only firm we know of that is using this system is A. Milne & Co., steel distributors at 745 Washington Street, New York.—Ed.

IMPELLER TEST PIT

Sir:

Please send me a reprint of "Vacuum Test Pit for Impellers" in Sept. 28 issue.

FRANK DZIELSKI, Quality Manager
Continental Aviation & Engineering Corp. Muskegon, Mich.

● Tear sheet mailed.—Ed.

MECHANICAL MOTION

Sir:

Please send us the name of an up-to-date book on mechanical motion?

BAYSIDE IRON WORKS
Everett, Wash.

● One of the best is "Mechanics of Machinery Mechanism," by Robert C. H. Heck, published by McGraw Hill Book Co., 330 West 42nd St., New York, at $5.—Ed.

ANGLE IRONS

Sir:

We wish to purchase some angle irons to be used for iron beds. We understand this material is made from rerolled stock.

J. G. EDELEN
J. G. Edelen Co., 5 W. Redwood St., Baltimore

● The following firms may be in a position to quote on angle iron stock: Calumet Steel Co., 310 South Michigan Ave., Chicago; Pollak Steel Co., Temple Bar Building, Cincinnati; West Virginia Rail Co., Huntington, W. Va.; and Franklin Steel Co., Franklin, Pa.—Ed.

ETCHED TOOL IDENTIFICATION

Sir:

Please send detailed information on price and delivery for equipment described on page 64 of the Nov. 30 issue.

ARTHUR E. ENGLER, Production Manager
General Tool & Die Co., 555 Prospect St., East Orange, N. J.

● This item describes a process being used in England. Similar equipment for marking metal by electrolytic action is made by Acme Metal Marking Equipment Co., 2232 West Fort St., Detroit 16. This equipment is named Met-L-Etch.—Ed.

THREAD ROLLING

Sir:

The three-part article by Frank J. Oliver on precision thread rolling practice is the most comprehensive and practical article on this subject that has come to my attention and must be due to indefatigable and unbiased effort coupled with a good engineering background in this subject. Please send 25 reprints.

H. BOCKELMAN, Manager
Cleveland Die & Mfg. Co., 748 East 82nd St., Cleveland

Sir:

This article covers its field so well you will probably have to make reprints. We would like to get six copies.

H. R. WIMMERSBERGER, District Sales Manager
Vulcan Crucible Steel Co., Aliquippa, Pa.

● These articles are being reprinted. Reprints will be available at cost in about a week.—Ed.

T and W STEEL STAMPINGS FOR Economy

Assembly of numerous products can be speeded by the consistent quality and uniformity of T & W Stampings . . . and the product can often be improved. Years of experience have contributed to Transue's ability to furnish stamped steel parts of close tolerance, uniform sectional thicknesses, and required physical properties. Thus, T & W Steel Stampings usually require less machining, less finishing, less time in assembly . . . . more economical for you.

Designers and Makers of Deep Drawn Stampings

SALES OFFICES: NEW YORK, PHILADELPHIA, CHICAGO DETROIT, INDIANAPOLIS, CLEVELAND

TRANSUE & WILLIAMS
ALLIANCE, OHIO

This Industrial Week . .

- **Secondary Steel Peak on the Make**
- **December Order Volume Increases**
- **Steel Industry Asks Price Relief**

WITH the steel industry winding up the highest steel production year in its history—estimated to be at 88,500,000 net tons—activity on urgent war requirements is increasing by leaps and bounds. This situation, because of events abroad, is assuming such large proportions that it may eventually show up as a secondary war peak in steel output.

The nature of demand from the armed forces which is subject to sudden changes forecasts a reappearance of production difficulties, last minute schedule changes and an alteration in the product-mix picture. Signs were apparent this week that the steel industry was well on its way to experiencing these variables.

Market conditions this week suggested that no matter what plans may be made for first quarter steel distribution, they are subject to changes depending on the progress of the war. Likewise there seems to be little hope in the near future for any relief over and above what is already being given for essential civilian needs and practically no encouragement for ordinary civilian requirements.

This tightness in the steel situation could melt away over night if Germany was definitely put out of the war. Until such time, however, it is apparent that the steel industry and its customers must return to that phase of steel deliveries and output which was prevalent some time ago when output of war goods was at its peak.

MANY steel companies were reporting December order volume at a substantial increase over October and November. Practically every steel item except plates is this week tighter than a few weeks ago including alloy steel, which has completely reversed its recent downward trend. While some steel deliveries fall further behind, new ordnance programs, some for old items including shell, shell containers and gun barrel forgings are steadily expanding. Rockets and heavy trucks are especially urgent and forge shops are at peak operations consistent with available manpower.

The plate situation has eased considerably and by the first of the year some steel sources believe that most wide continuous sheet mills which had been rolling plates will be able to devote most of their time to hot rolled sheets. Any sudden demand for plates, however, would change this position. The Maritime Commission continues to dissipate its inventories as far as possible in lieu of ordering plates for completion of its program, but any change upward in the shipbuilding program by mid-1945 would be immediately reflected in plate output.

This week steel bars show the heaviest carryover item, but the amount of these carryovers varied from company to company. As soon as the shell steel program unfolds itself on a greater tonnage basis, it is expected that carryovers will be heavier. The Army has been sending expediters to various shell plants in order to speed the output.

Structural orders continue heavy this week with demand especially active from the Navy. The outlook from structural steel production because of sudden requirements from the armed forces is expected to be bright for some time.

POSSIBLE reinstatement of at least a portion of the cutback landing mat program, shaving down of a projected increase in tin plate and an expansion in rail production are some of the ideas involved in the planning of first quarter steel directives. Any attempt to return the landing mat program to mill schedules in important quantities may run into difficulty. This program lost its place in the steel lineup when large tonnages were withdrawn from the books in October. The gap has since been filled by other authorized CMP orders for flat rolled products. It will probably take a WPB directive to reinstate landing mat steel.

Efforts to increase rail production will run into the problem of controlled cooling capacity, already filled close to the brim. The output of rails will also be closely gaged to shell steel output. A cut in tin plate would alleviate some of the manpower shortage, the greatest single factor which is now complicating the production of light gage and highly finished items.

The expected petition for price relief by the steel industry has been made to the OPA. About four to five weeks will be required for the industry to gather its cost data for the OPA. The Steel Advisory Committee has requested the OPA to give as early a decision as possible. The resolutions presented to the OPA cover requests for price relief on increased costs, exclusive of the latest wage award, increased costs if and when the wage award becomes effective and increased costs due to the retroactive feature of the recent wage adjustment.

Scrap continues tight with prime grades in good demand. Practically all of the latter are at ceiling levels. THE IRON AGE steel composite price is unchanged this week at $19.17 a gross ton.

Steel ingot operations declined half a point this week to 95.5 per cent of capacity. Pittsburgh output is down one point to 91 per cent as is Chicago at 100 per cent. Other district declines occurred in Youngstown, down two to 94 per cent; Wheeling, down half a point to 91 per cent; Cincinnati, down half a point to 95.5 per cent, and the Western area, down three points to 89.5 per cent. Cleveland is up two and a half points to 96.5 per cent and Buffalo is up two and a half to 104.5. Unchanged from last week are Philadelphia at 96; Birmingham at 99; Detroit at 100; St. Louis at 94.5, and the Eastern district at 90 per cent.

• **STEEL PETITIONS OPA**—Through the OPA Steel Advisory Committee, the steel industry has petitioned OPA for price relief covering three distinct categories: Relief from accumulated increases in steel costs; relief from the latest wage award when it becomes effective, and relief from the retroactive feature of the WLB award. It will take about a month or so for the steel industry to present cost data to OPA and a speedy decision has been requested. OPA may, if it agrees with the industry's stand, call any price action "an adjustment." Adjustments, if made, and there is a good chance that some increases will be granted, will be on a product basis. Several companies have, for the record, notified OPA of their desire for higher prices. This is in line with certain routine requirements.

• **WAR PRODUCTION REVERSAL**—The heavy influx of war steel orders with more to come, the tightening of deliveries and the remaking of plans and programs will bring back scheduling headaches in the steel industry, many of which had disappeared a month ago. With emphasis on shell steel and with its effect on the output of other products, carryovers are already beginning to take shape in larger amounts. This time the Armed Forces are expected to keep pushing their requirements with little or no letup until Germany is definitely and actually out of the war. Postwar plans, for this reason, will get little hearing and the steel problem will be to so schedule war needs that they will take the head of the parade regardless of what is pushed back. One item which had been coming along at a good clip but which will suffer more as ammunition steel is produced in larger chunks will be rails. Originally setup at 600,000 tons a quarter and later cut to below that figure, there is now a good chance that more slashes will come even though rails are sorely needed in view of last year's program reduction. It is the old question of shell steel coming off the same mills as other products as well as the competition for available raw steel.

• **HOUSEWIRING OBSOLETE**—Ninety-five per cent of the 32,000,000 homes in the United States are electrically obsolete, according to John H. Squires, Jr., field superviser of the Better Homes Department of the Westinghouse Electric & Mfg. Co. Mr. Squires said that most American homes are wired only sufficiently to take care of the basic minimum of present electrical needs.

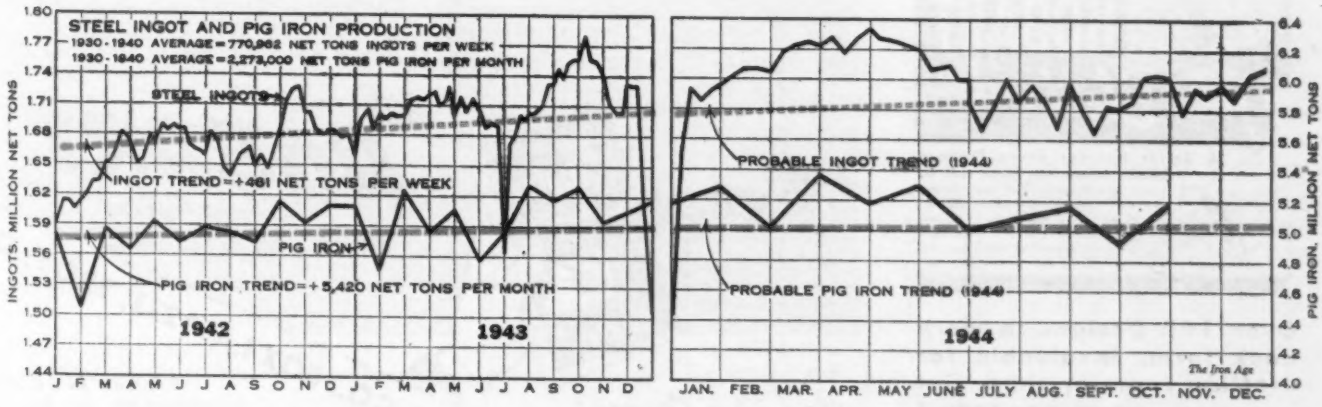
• **OPEN FOUNDRY CAPACITY**—Seventy-three gray iron foundries, 20 per cent of those replying in a recent survey by the Washington office of the Gray Iron Founders' Society, has open capacity in mid-November. Better than 50 per cent of the foundries which reported extra facilities are equipped for a wide range of machine tool castings.

• **STEEL OPERATION**—In the past year most of the variations in the steel ingot rate have been caused by the fluctuations in the output of bessemer and electric steel. The operating rate for open hearth steel has been fairly stable even with the increase in capacity. The country's open hearths have been running at between 95 and 100 per cent of capacity since January 1943. In the past six months a decline has occurred in the rate for bessemer and electric steels. In the latter case one reason has been the falling off in overall alloy steel demand coupled with increased facilities in 1944. The greater requirements for war steel may cause a change in the downward trend in the ingot operating rates to the extent of raising bessemer and electric steel output. This would run counter to thoughts expressed before it became so bitterly apparent that the war was not over in Europe.

• **AUTO MEN AND NON-FERROUS METALS**—Recent remarks by automobile executives with regard to aluminum and magnesium replacing steel on motor cars point up to the price angle. One executive said recently at New York that until the price was such that these items could be used in place of steel, there was little chance of a changeover. However this price angle is not universally held as some executives feel that for certain parts and functions a further extension of the use of non-ferrous metals in place of steel might be advisable. The postwar period will solve the problem and answer the question.

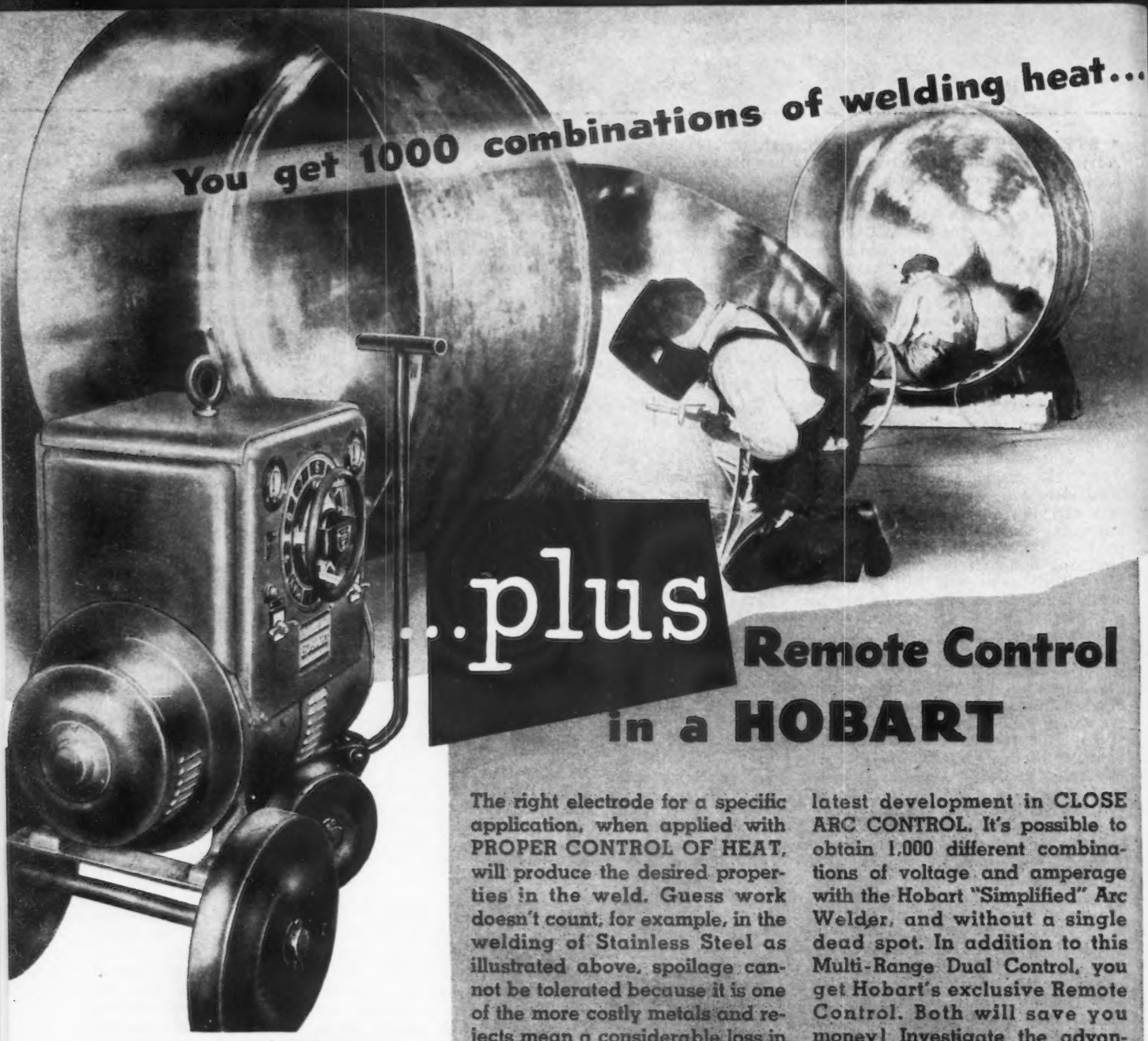
• **ABSENTEEISM**—Through October of this year absenteeism has cost 95,000,000-man days of unauthorized idleness in munitions industries, (excluding strikes, sick leave or paid vacations) according to an average of absentee rates computed in a sampling of about 25 war industries by the Bureau of Labor Statistics. Absenteeism for the 10,000,000-man labor force in munitions industries, if sick leave is included on this basis may reach the amazing total of 190,000,000-man days in 1944, or 6.46 per cent of the total working time. Allowing 2½ per cent of this absenteeism rate for sickness, it can be shown from the foregoing that workers in the munitions industry could have each taken a total of 11.88 days leave which were unaccounted for by strikes, paid vacations, sick leave, or absence caused by industrial accidents.

• **MAGNESIUM PLANT TO MAKE SHELLS**—Replacing magnesium production, which soon will be halted at the Basic Magnesium, Inc., DPC owned plant at Las Vegas, Nev., Rheem Mfg. Co. will take over a substantial section for ordnance production, the company has announced. Rocket projectiles will be manufactured for the Navy and 81 mm. mortar shells will be produced for the Army. The contract involves installations of approximately three million dollars worth of machine tools. Alterations will be made, and the plant leased by DPC.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
December 12...	92.0	101.0	94.0	96.0	94.0	102.0	91.5	99.0	100.0	92.5	96.0	94.5	90.0	96.0
December 19...	91.0	100.0	92.0	96.0	96.5	104.5	91.0	99.0	100.0	89.5	95.5	94.5	90.0	95.5



...plus Remote Control in a HOBART

The right electrode for a specific application, when applied with PROPER CONTROL OF HEAT, will produce the desired properties in the weld. Guess work doesn't count, for example, in the welding of Stainless Steel as illustrated above, spoilage cannot be tolerated because it is one of the more costly metals and rejects mean a considerable loss in both time and material.

The right type of electrodes is plentiful, but are you sure you're getting the PROPER HEAT CONTROL with your present welding equipment? Hobart offers the latest development in CLOSE ARC CONTROL. It's possible to obtain 1,000 different combinations of voltage and amperage with the Hobart "Simplified" Arc Welder, and without a single dead spot. In addition to this Multi-Range Dual Control, you get Hobart's exclusive Remote Control. Both will save you money! Investigate the advantages of Hobart "Simplified" Arc Welding today! Coupon for your convenience.

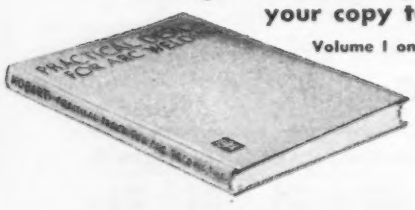
HOBART BROTHERS COMPANY
Box 00000, Troy, Ohio
"One of the World's Largest Builders of Arc Welders"

Try 'em and you'll prefer them.
HOBART
Electrodes
A Better Rod for Every Purpose
Hobart laboratories make rods for each specific job. It is tested—improved—perfected—order Hobart Electrodes and you'll understand why they're the choice of those who want quality. Write for your price list.

FREE!
Vest Pocket Guide for Welders! Handy information that all weldors will use. Tables, charts, etc.

HOBART "Simplified" Arc Welders

Over 100 Designs in work book form. Invaluable for drafting room or shop. Get your copy today!



Volume I only $3.50 Postpaid

Mail This Coupon!

HOBART BROTHERS CO., BOX I.A. 1233, TROY, O.

Please send me information or books checked on coupon below.

- ☐ Gasoline Driven Welder
- ☐ Electric Motor Driven Welder
- ☐ Arc Welding Electrodes
- ☐ Vest Pocket Weldors' Guide
- ☐ "Practical Design for Arc Welding"

Name_____

Address_____

City_____ State_____

BUY WAR BONDS!

War Production Reversal Reaches Industry

New York

• • • **The reverse field** play in the war production program has sifted down from the Washington level to the industry level this week where it is cropping out in every war production center in style reminiscent of early 1942.

While declarations of "extreme urgency" continued to come from Washington, and explanations of the situation continued to come from the war agencies, the WPB and the Armed Forces expanded the production schedules and moved to furnish the all-important manpower needed to get the job done.

One of the most concrete moves, and most enlightening on the true manpower situation, was the announcement by the WBP of the closing of five plants producing machine guns for Army Ordnance to release men for "must" item production. The cutback on machine guns will total $23,000,000 and is designed to free 6000 workers. Thus official cognizance is taken of the fact that pressure must be released before appreciable manpower can be applied to the shell program.

The plants affected, working on .50 cal. machine guns which are ahead of schedule, are: Browne-Lipe-Chapin Division of General Motors, in Syracuse; Savage Arms Corp., Utica; Kelsey-Hayes Wheel Co., Plymouth, Mich.; Colt's Patent Firearms Mfg. Co., Hartford, Conn., and Buffalo Arms Corp., Buffalo.

Official estimates are now, that the overall revision of shell and gun production program will cost $250 million, and the mortar program $500 millions, including construction of facilities.

Sudden about face to increased war production is evident in the New York area as in others with particular emphasis on expansion of Army schedules. In the Long Island aircraft industries, the comparison of Army and Navy programs is in direct contrast. Republic, an Army Air Forces producer, had been cut back on its P-47 production both here and in Indiana, and had announced its postwar private plane, an amphibian. Grumman, an exclusively Navy producer, was going forward at top speed. The Republic

By THE STAFF

o o o

schedule now calls for additional overtime hours for workers and eliminates the tapering off that was planned.

•

Ordnance Closing Machine Gun Plant

Buffalo

• • • **Readjustments in the** Niagara Frontier industrial setup to meet the trend of war production include:

At Buffalo Arms Corp., Army Ordnance announced cancellation of $8,900,000 in machine gun orders and complete shutdown of the plant by February 1, releasing 2,000 workers for war producers on the "critical" list. U. S. Employment Service is to channel employees to new jobs. Arms plant, owned by DPC, will be kept in readiness for resumption in event facilities are needed.

GMC Chevrolet Division's three Buffalo plants are prepared to begin on $194,000,000 AAF order for larger and heavier Pratt and Whitney engines to power "must" warplanes. Present employment of 9,000 will be increased to 18,000 by June. By agreement, only women will be hired until March, to avoid dislocation of manpower situation.

The steel rate increased 12 points in the last two weeks to 102 per cent by relighting of four open hearths at Bethlehem's Lackawanna plant. Leading mills are turning out war steel at practical capacity of forces and facilities. All of them need more men.

Pig iron supplies are tight with reconversion of two district foundries (U. S. Radiator at Geneva and Utica Foundry) from magnesium and aluminum to gray iron adding to pressure. There are only three idle blast furnaces in the area.

The area WMC Committee, whose labor members for more than a year had blocked importation of Jamaicans to work in heavy industry, voted to let labor and managements of individual plants decide in each case. Labor previously had petitioned Byrnes to classify the Frontier section as a "rare and unusual" case, thereby permitting higher wages to attract "home" workers. A resolution offered by laborite was approved 9 to 1, with one not voting.

Leo A. Sweeney, head of the Buffalo office, USES, listed these 20 plants on "critical" list:

Acme Steel & Malleable, American Brake Shoe (castings division), Bethlehem Steel, Carborundum Co., Columbus-McKinnon Chain, Dunlop Tire & Rubber, Durez Plastics, Dusing & Hunt, Frontier Bronze, Harrison Radiator, Hooker Electro-Chemical, Lake Erie Engineering, Linde Air, Lumen Bearing, Morrison Steel Products, Republic Steel, Ross Heater, Standard Buffalo Foundry, J. H. Williams & Co., and Worthington Pump.

•

Urges Manpower Aid

Washington

• • • **Representative Francis Case, Republican of South Dakota on Dec. 13 introduced a "little" national service act to raise a maximum 100,000 workers to bolster behind schedule production programs, to prevent turnover, and stop leaks in the manpower pool.**

The bill would create a National Service Corps as a component of the Army, utilizing the existing machinery of the Selective Service System for the selection of members who would receive the pay, injury, unemployment and retirement benefits of civil service employees but the reemployment rights of soldiers.

Withdrawals of manpower would be put on the basis of state quotas and whenever workers were assigned to private industry, the government would be reimbursed for such services by the benefiting company.

•

First Quarter Steel For Shell Program

Pittsburgh

• • • **There has not** been too much of a change in this area in recent weeks. In October and November the steel companies indicated that their orders had taken a slump and can-

cellations were high. This same picture is true through December thus far. Orders have not been up to the peaks of the early months of the year except in specific items such as galvanized sheets and shell steel. However both of these items are being carried on books way into next year.

As regards civilian production and its possibilities the shell program and its heavy steel demands knocked out any potential civilian production on any kind of a large scale at least through the first quarter of next year and quite possibly through the first six months. Spot authorizations and Z orders are just next to valueless. While there are some such orders coming in there is very little likelihood that they will be filled. An example of this trend is the fact that the Carnegie-Illinois Steel Corp., in November shipped only 2500 tons on Z orders.

There is a good possibility that steel production might show a mild decline in this area from now through January. Bad weather has set in here and materials handling is slowed up, absenteeism is up a bit, and in general the normal operations are somewhat disrupted.

While carryovers were a thing to be talked about going into the third and fourth quarter of this year, they were worked down pretty well when the Maritime Commission had its plate requirements trimmed. Now carryovers are with us in quantity again because of the shell program. The shell steel requirements are backing up deliveries of rails, structurals, semi-finished, and especially bars. Thus, carryovers again are mounting.

There is a great deal of activity in the sale of steel piling especially piling. A recent order was shipped from Pittsburgh to Guam on a Navy billing and another is probably just being completed for shipment elsewhere.

•

Schedule Jumps Bring Manpower Nightmares

Detroit

• • • The changeover in thinking from reconversion planning to amplified war output is clearly evident in this war goods capital.

Schedules are being enlarged right and left on shells, tanks, certain aircraft assemblies and components, chemical requirements and other materiel, while ambitious plans for early reconversion are being shelved. The cry of manpower shortages is being heard once more, for the first time since last spring.

The Detroit (Chrysler) Tank Arsenal reported recently that its output of four tank models during November was the highest for any month in its history except December, 1943. Fisher Tank Arsenal schedules have been amplified also. The Willow Run bomber plant has advanced its projections, requiring a modest increase in employment, and forthcoming rates will be close to the ship-an-hour rate of the peak days of this B-24 plant operated by Ford Motor Co.

New shell contracts are rapidly coming into play and will be steadily enlarged. Backed up behind these are plans to enlarge the output of small arms ammunition, and then mortar shells. Additional facilities are being prepared for several of these, some of which will not come into production until next spring. Meanwhile the assembly of heavy trucks, a problem child of the war effort for the past two years, is making steady progress.

Alongside these gains, the reductions in other contracts are comparatively minor. The largest cutback appears to have been in the Merlin Rolls-Royce engine built by Packard Motor Co., which laid off 5000 workers in recent weeks, cutting its payroll below 30,000. Reductions have also appeared in several plants producing B-17 components.

Nevertheless, manpower shortages continue critical. The Detroit War Manpower Commission reported in December that Detroit was short nearly 20,000 men. Efforts were being made to fill this gap with the surplus of women workers in the district.

•

Z Allotments Wither With "Spot" Program

Chicago

• • • Small as they were, nearly all "Z" allotments of controlled materials have been pushed from local mill schedules by the mounting influx of orders reflecting the resuscitated war program. This, plus labor shortage, effectively sabotages any possible wide-scale activation of civilian production through spot authorizations, but there is rapidly growing a far greater threat to the stay-at-home economy.

Some mill executives declare that WPB directives have filled their order books far beyond capacity to produce. Mounting carryovers mean that some authorized CMP orders will be delayed, or go by the boards altogether if no open capacity can be found. It is a cinch that so-called essential civilian orders will get the ax, even though they carry regular CMP allotments, rather than direct war goods.

Talk has been heard of formally withdrawing Z allotments, but whether or not this is done is of little consequence because they are so small in proportion to the overall production picture. Fourth quarter Z allotments of copper products for instance, amounted to only 369,206 lb. of brass mill products, 53,685 lb. of wire mill products, and 306,228 lb. of castings. This compares to total estimated deliveries for all purposes of 1,150,000,000 lb., 230,000,000 lb. and 310,000,000 lb. respectively.

In the final analysis, however, the determining factor remains the same as for several months, manpower. Farm equipment production, though it has a greenish light for materials, is behind schedule all along the line be-

WHERE IT GOES: ***One of the most important items in the new war production schedules is mortar ammunition. Being fired by this Negro squad in Italy is the standard infantry mortar.***

AT LEFT

EISENHOWER EMISSARIES: *Sent by the Supreme Allied Commander to describe the urgent need for additional artillery ammunition are these six men shown examining war production in Acf's plant in Buffalo.*

AT RIGHT

LESS OF THIS: *Just getting into operation is American Can's civilian production of wash tubs. These activities are being curtailed.*

cause of inability to recruit and hold a full labor crew. It is a distinct possibility that some farm equipment manufacturers may have to stop shipment on authorized material orders in order to avoid exceeding inventory regulations.

•

Pacific War Occupies Plants of California

San Francisco

• • • **The West Coast** is not behind schedule on any "must" program, according to conservative WPB officials and despite discouraging turnover in manpower in war industry and unrealistic claims of manpower shortage running into five figures.

No significant cutbacks have been made. Aircraft contract terminations have been replaced with new contracts. In four months 126 terminations were settled, including a negotiated settlement of $1,590,782.93 on the hundred million dollar North American B-25 Mitchell bomber termination, involving also 889 sub-contractors. Established manufacturers would welcome limited cutbacks to permit better service on standard products and parts. Pressure is being constantly exerted in this area for expanded activity and production on four-motored bombers, oil tankers, attack transports and Navy warehouse, terminal and auxiliary facilities. Available housing limits manpower for added production and augmented Navy and Maritime repair and shipping activities.

Construction still continues on Navy shore facilities. In this region new items for civilian economy or post war development will not generally proceed past the drawing boards until the pressure on production for and traffic and service of the Pacific war operations has eased and passed.

•

Superfort Schedule Strong Until 1946

Seattle

• • • **This city** is apart from some other parts of the country in the reconversion problem. There has been no serious thought of partial conversion here now, only expansion. Geared for the Pacific war, Seattle enlarged its present industries to take care of the immediate needs, and worries little of the future. While other areas are faced with changing to peacetime needs or goods for another war theater, the Pacific's increased tempo has put the heat on the Northwest. Boeing Aircraft, builder of the B-29 which is used exclusively against Japan, has a backlog totaling $1,145,000,000 which will run well into 1946.

With the builders working at capacity, Betlehem Steel, Isaacson Iron Works, Pacific Car and Foundry and Northwest rolling mills also have built up backlogs. They have neither time nor material for peacetime needs. All are making plans and preparing for the end of the war, but take no action. Isaacson's have continued to make a few tractors and are looking hopefully to the future. Pacific Car has a line of logging and marine equipment to fall back on. Boeing has its new Stratocruiser, the prototype of which has been built. There is only one problem facing the Northwest—manpower. Boeing has started nationwide recruitment of labor to get an additional 3000 workers. Todd's are worried about production schedules due to lack of help. Every foundry needs men immediately. Northwest rolling mills have been forced to one shift.

Todd Moves to Break Castings Bottleneck With New Must Identity Plan

Washington

• • • **Steel Division Director** William B. Todd, in a new move to break the bottleneck on critical castings production, has advised all iron foundries of plans to identify "must products" for which castings are urgently needed. Special ratings or directives will be used to push castings production ahead on these urgent war programs, he said.

In a letter to all ferrous foundries recently, Mr. Todd said that the Services working in close cooperation with the identification programs have instructed their local procurement offices to designate to their prime contractors all end products in the top urgency list. Prime contractors have been requested in turn to transmit such information to their subcontractors, who will advise their suppliers.

Mr. Todd said, "We believe that such information furnished to the foundry will be of material aid in the identification of material castings required for the urgency programs. Castings for these programs must be produced quantitatively and qualitatively at the time required to meet the needs of the armed forces."

At the same time, another move to better schedule components was taken by Harold Boeschenstein, WPB Operations vice chairman through the appointment of Robert M. Hatfield as his special assistant in charge of engine parts control. Mr. Hatfield will be responsible for securing vitally needed engine parts required by the Army and Navy and other government agencies, and will maintain contact with the field through WPB representatives in the engine and parts manufacturing plants.

o o o

WPB Lists Drawbacks To Making of Metal Household Furniture

Washington

• • • **The material situation** as it applies to the metal household furniture industry was outlined by WPB recently as follows:

Orders for hot rolled steel sheets cannot be scheduled for delivery before May, and for cold rolled sheets before March. Capacity for increased sheet production is available, but manpower is not.

Military requirements for brass mill products for ammunition production have been increased to such an extent that deliveries for civilian goods will probably be seriously affected.

Nickel anodes and chemicals for plating, such as chromic acid, are critical, and no alleviation of the nickel anode situation for civilian production after the defeat of Germany is expected.

Aluminum is obtainable under the Controlled Materials Plan.

The Household Furniture Industry Advisory Committee who received the foregoing information reported that the difficulty of obtaining suitable materials hampers quality production under the "spot authorization" procedure (Priorities Regulation 25). Another disadvantage of PR-25 cited by the committee is that manufacturers are unable to obtain materials for civilian production quickly enough after war contracts are terminated.

The committee emphasized that PR-25 cannot be regarded as a device for reconverting industry. To effect speedy reconversion, industry requires permission to order and stock sufficient materials and components for several months' operation in advance of reconversion, committee members said. If materials and components cannot be ordered until after reconversion is permitted, delays in obtaining delivery will result in layoffs and extremely low initial production and closing of plants.

Obtaining crating and packing materials, lumber, chrome and plating hardware, alkyd resin finishes, and titanium pigments, committee members said, will be among the industry's biggest problems when reconversion is begun.

Demand for metal household furniture will be exceptionally high for at least two years after the war, the committee predicted. To meet the expected demand, production may need to be increased over 1941 production by more than 100 per cent. Employment in the industry therefore could be raised above the present level, the committee said.

Industry members suggested that WPB make arrangements to list war production equipment that may be available for sale by manufacturers after the defeat of Germany.

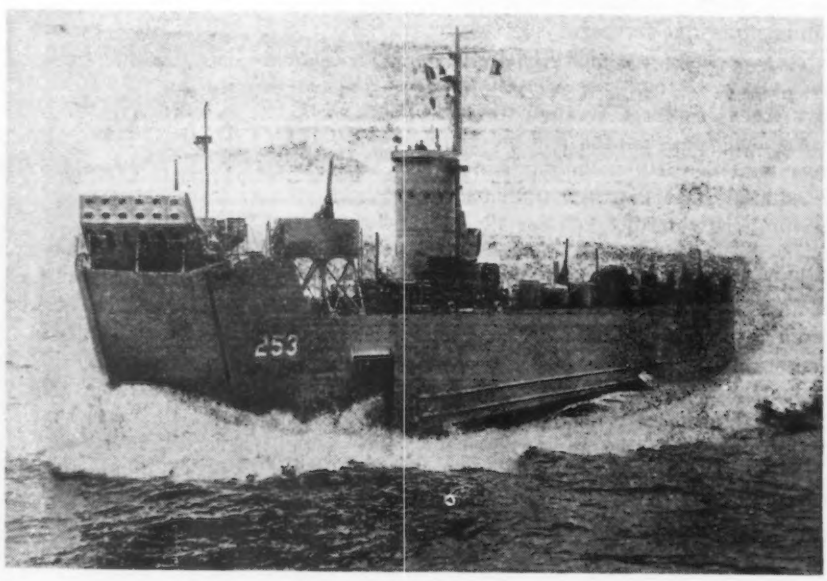
War Needs Come Ahead Of Liberated Nations' Reconstruction Aids

Washington

• • • **The Combined Raw Materials** and Combined Production and Resources Boards said on Dec. 13 that allied war needs come before the reconstruction and reconversion needs of liberated countries.

Such requests will be given careful

LSM: *Addition to the already large collection of specialized transport vessels developed for the operations of amphibious warfare is the Landing Ship, Medium. Federal shipyards in New Jersey are among the builders of this vessel.*



scrutiny and include: France's desire to purchase 700 locomotives; 60,000 freight cars for various liberated countries; highway repair machinery for Italy; coal mining machinery for Spitzbergen; and steam and diesel locomotives for a number of countries, the report said.

Liberated countries have said that they want to get from this country "everything from horseshoe nails for Sicily and fish hooks for the Greeks to water-pumping machinery for the Netherlands."

The report stated: "Although allocations are being made and shopping licenses issued, the amount that can be delivered to liberated lands is severely limited by other demands on United Nations shipping and by limitations of port facilities and inland transportation in Europe. Military needs must inevitably come first.

Steel Maintenance Material Shortages Are Under Scrutiny

Washington

• • • **The Steel Mill Maintenance** and Repair Industry Advisory Committee at a recent meeting with WPB officials considered plans to combat possible shortages in steel mill operating supplies and facilities. Shortages in lumber, machine tools, and some chemicals were listed by WPB officials as most critical items which may affect steel production.

A Lumber Division spokesman said that there was not sufficient dry lumber available over the winter months to take care of boxing and crating requirements. Steel mills and others who packaged their products in wood containers would be forced to use some green wood, he stated.

Reinstated demands for the larger type machine tools, fostered by the expanding heavy ammunition program, had pushed back delivery dates substantially, a representative of the Tools Division told the committee. Committee members stressed the need for prompt deliveries of milling and machining equipment to maintain production schedules on critical products and were advised that the Tools Division would grant relief in cases of extreme urgency.

Chemical Division officials also pointed to the critical position of sodium metal, stating that this material was used in the manufacture of tetraethyl lead which in turn is an important component of high octane gasoline. Use of this chemical had been frozen at previous six months level, he said. Committee members emphasized the need for this chemical in descaling stainless steel, but WPB spokesmen said the steel industry must use conservation measures to assure adequate supplies.

Liberalized Warehouse Plan Must Not Hinder Urgent War Programs

Washington

• • • **Steel warehouses** will be allowed to increase their stocks of general steel products under Direction 3 to Order M-21-b-1 issued by the WPB Steel Division. This liberalized plan will not be allowed to interfere with war production schedules, WPB said. The new direction to the Steel Warehouse Order excludes merchant trade products such as pipe, galvanized sheets, tin and terne plate and wire products. Present and expected production of these products does not warrant additional warehouse stocks at this time, the direction stated.

Warehouses in the Pacific Coast region may place orders prior to Feb. 1, for delivery in the first or second quarter of 1945 up to 35 per cent of the general steel products delivered from their stocks in the third quarter of 1944 or in the base period of 1941, whichever is greater. This region includes Arizona, California, Idaho, Nevada, Oregon, Utah and Washington.

In other states and United States territorial possessions, warehouses may order up to 25 per cent of deliveries in either of the periods mentioned. The higher percentages allowed in the Pacific Coast region, the direction revealed, were established to compensate for the generally lower warehouse inventories in those states in relation to their sales.

Authorizations granted under this direction are in addition to amounts permitted by paragraph (c) (1) of Order M-21-b-1 which allows 100 per cent replacement of deliveries from stock made in the preceding 90-day period.

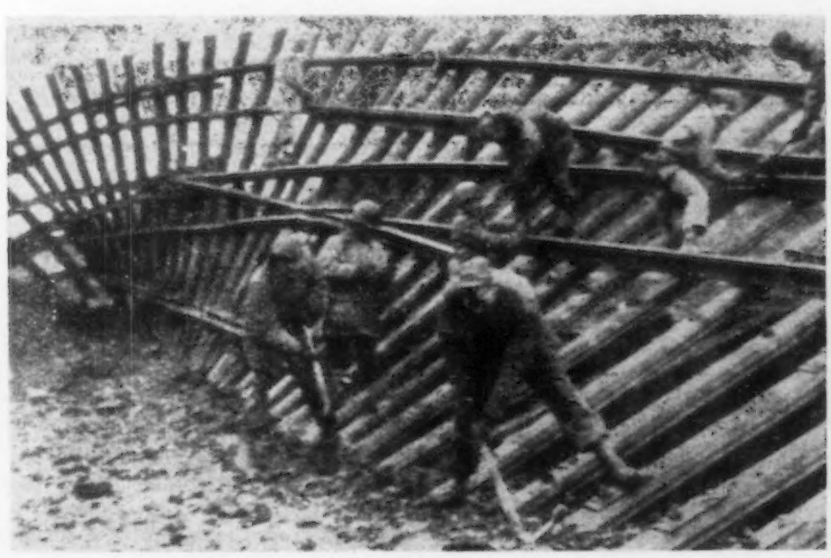
New Equipment May Be Installed Without WPB's Authorization

Washington

• • • **WPB has announced that** producers operating under P-68, the maintenance and repair order for the iron and steel industry, may now obtain materials required to install or relocate equipment without restrictions as to dollar value. Previously producers were limited to a $500 ceiling. Removal of the restriction placed the order in line with the provisions of paragraph (a) CMP Regulation 5, Direction 15, as amended Nov. 4. That amendment allows anyone operating under the regulation, who has obtained machinery or equipment, to install it or relocate it without WPB permission.

The new amendment also brought P-68 up to date by eliminating references to WPB orders and schedules which are no longer applicable.

SECTION HANDS: *Twisted rails wrecked by retreating Germans in France are being put back into working order by members of the 773rd railroad operating battalion of the Third Army.*



U. S. Steel Official Forecasts Plea For Price Relief to OPA

Chicago

• • • **Application will be** made to the OPA by United States Steel Corp. to increase steel prices sufficiently to cover increased labor costs, Enders M. Voorhees, chairman of the Corporation's finance committee, said here last week.

Ed. Note: Petition for price relief has been made to OPA by steel companies.

The total amount of recently granted wage increases may not be known for some time due to the immense task of determining intra-plant inequities and other adjustments provided by the WLB decision, he said. Reserves will be set aside to meet the wage increases, which are retroactive to Jan. 3, 1944, but the amount provided can be little more than a guess, according to Voorhees.

The Corporation currently is in the best financial position in its history, the finance committee chairman declared, but in the poorest shape from the standpoint of future profits.

Terming the condition typical of industry generally, he said, that because of difficulty of computing labor costs and other factors, true wartime earnings could only roughly be computed. A true and accurate profit position cannot be determined for some time, he stated.

Pointing out that U. S. Steel set aside in 1943 about $135,000,000 for postwar plant improvement and modernization, Voorhees said that a much larger amount would be provided this year. By inference, it was indicated that a portion of this fund might be used if it were decided to acquire government owned facilities after the war.

He recognized a difficulty in properly pricing government plants, pointing out that if prices were too low, it would subsidize competition, whereas over pricing would make operation impossible.

In a previous speech before the Illinois Manufacturers Association, Voorhees took a whack at various new tax revision proposals as "mathematical abstractions." He called for a complete revision of the tax structure, rather than patching the current revenue law. Taxation plans on projection of national income to determine a tax base were classed as impractical.

"We get exactly nowhere by talking about specific sections of the current revenue law. It is impossible to exempt any group or section of our people from taxes without penalizing the others to the point of destruction. The day of assessing taxes on this group or that, according to the volume of squawk, should have passed—although a lot of people do not yet know it.

"In my view, the preliminary to a moral and, therefore, workable tax plan lies not in projecting a dollar income to cover the cost of sustaining government in the style to which it has accustomed itself, but rather in the careful examination of our economy to learn how and what part of our goods and services can be turned over to the government and still leave us able to promote real human progress."

The corporation income tax was characterized as a hidden sales tax "which everyone paid in the price of goods but which only the efficient producers turned over to the government.

ICC Denies Freight Rate Relief But Door Remains Partly Open

Washington

• • • **Freight rates will** remain stable for a while at least. This was made clear on Dec. 13 when the Interstate Commerce Commission declined to reinstate at this time the 4.7 per cent freight rate increase of March, 1942, by further suspending the Ex Parte 148 increases for an additional year.

However, the commission refused to cancel the increase permanently and held the case open on its docket for quick action at any time within the next year should rail earnings slip below a comfortable level.

Hinting strongly that it thought that rail rates would have to be boosted substantially, the ICC said that it believed railroad traffic would drop rather sharply following the end of the European war. Two commissioners favored reinstatement of the "modest" increase of 4.7 per cent now.

In addition the commission refused to eliminate a 10 per cent passenger fare increase which it authorized in February, 1942.

The railroads had asked the commission for a reinstatement of the increase on Jan. 1, but government stabilization agencies had asked that a permanent cancellation of the freight rate increase be ordered which ICC has held in abeyance by temporary suspensions since May 15, 1943.

Farm Machine Output Dropped 25 Per Cent Behind Schedules

Washington

• • • **The Farm Machinery** and Equipment Industry Advisory Committee was told recently by WPB officials that production of farm machinery exclusive of wheel tractors, repair parts and attachments, for the four months' period July 1 to Oct. 31, was approximately 25 per cent behind manufacturers' schedules.

Military requirements, which are more critical than they were two or three months ago, are creating critical shortages in components needed for farm machinery production, WPB officials said. Nothing must stand in the way of meeting military programs necessary for the successful prosecution of the war, they pointed out. The committee's advice was sought on how to raise farm machinery production up to scheduled levels in the face of this situation.

Discussion brought out that industry members consider manpower shortages the number one factor retarding production. Malleable and grey iron castings, needed in large quantities in the manufacture of farm machinery, are the chief components in short supply due to lack of manpower in the foundries, they say.

WLB Turns Down Steel Reconsideration Plea

Washington

• • • **The War Labor Board** on Dec. 13 peremptorily turned down a petition filed by 73 of the 86 companies in the "basic steel," case.

Chairman William H. Davis, in making the announcement said:

"The petition for reconsideration filed by 73 of the 86 steel companies covered by the National War Labor Board's decision in the 'basic steel' case was denied today by the Board.

"The Board decided that the petition contained no grounds warranting reconsideration of the case since the points raised by the petitioners had been fully discussed in the hearings on the case, and in the Board's discussion before it reached its decision on Nov. 25."

The comparative speed of the WLB decision to deny the companies' appeal was made possible, WLB spokesmen said, by the USWA's waiving of its right of comment or appeal within 14 days from the date of the decision.

Russian Automobile Factory in Midst Of Urals in Production

New York

• • • **Among the manufacturing** units moved by the Russians during the early German onslaught was a large truck manufacturing plant for the production of a standard all purpose truck.

The plant was constructed in the industrial region of the Urals, where metallurgical plants, raw materials and power supply are convenient. Components were being produced within four months after construction started, but the actual plant project was not completed until July of this year.

The truck in production designated the ZIS-5 appears to be a general utility truck roughly comparable to an American model of about 10 years ago. Production methods, utilizing conveyors, and power tools appear to be approximately similar to those in use in this country.

URALS AUTO WORKS: *In a shallow bowl far back in the Urals mountains the Russians have constructed a plant for the construction of trucks. Construction was started in the winter of 1941, when the Germans threatened to overrun all of European Russia, and final units were completed this summer. The truck rolling out of the plant is equipped with a single headlight, otherwise resembles familiar American models of several years ago.*

Steel Meeting Recessed

• • • **The collective bargaining** conference between Representatives of steel manufacturing subsidiaries of U. S. Steel Corp. and the Steelworkers Union recessed on Dec. 15, subject to a joint call of the Conference Chairman and Secretary, John A. Stephens, vice-president of U. S. Steel Corp. of Delaware.

Mr. Stephens said the adjournment was proposed by the union, which insisted that four sections of the recent WLB Directive which are subject to action by the OPA and the Director of Economic Stabilization, Fred M. Vinson, be incorporated immediately in a labor agreement. Mr. Stephens had announced on Dec. 11 that the meeting had been arranged to discuss only those parts FXX of the WLB Directives now in effect.

Civilian Goods Frozen To Fourth Quarter 1944 Production Level

Washington

• • • **In a further move** to discourage the exodus of workers from war plants WPB has frozen all production of civilian goods to 1944 fourth quarter levels for an indefinite period. This new order, effective Dec. 7, which has been distributed to WPB officials is based on the premise that fourth quarter programs for civilian goods are sufficient to maintain essential war supporting activity in civilian economy and to fulfill essential export requirements.

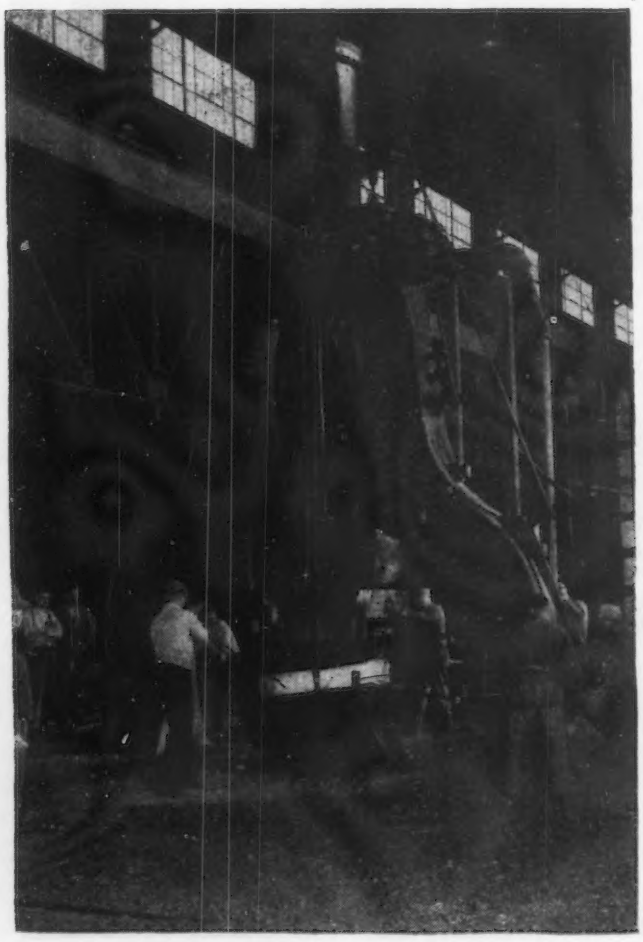
Until this order is amended or rescinded WPB will not approve increases in programs entitled to firm controlled materials allotments and base-ratings priority assistance in excess of the quantities necessary to fulfill essential requirements. The order also states that WPB will not approve amendments or revocations of L or M orders which would result in any increase of production over the level authorized for the fourth quarter of 1944 unless such amendments or revocations are specifically supported by approved programs.

Requests for increases in production over fourth quarter levels will only be granted if the claimant agency or industry division presenting the request makes a positive declaration that the fourth quarter level is clearly below the essential requirements, and that the increases will not interfere with more essential production.

Increases under the spot authorization plan will be permitted in loose labor areas, but the 90-day ban on spot approvals in some 120 critical labor areas remains in effect.

Any deficiency in meeting an authorized production schedule during any calendar quarter may be made up only in the first month of the following calendar quarter.

In the case of decreases in military requirements for trucks and truck tractors, off-the-highway trucks, truck trailers, motorcycles, power cranes and shovels, heavy motor graders, tracklaying tractors, bicycles and powercycles, commercial electric food equipment, cutlery, industrial power trucks, typewriters, commercial laundry equipment, 35 mm. motion picture equipment, cutlery, industrial power tives, railroad cars, and bus bodies any increase in non-military production will be authorized only after a local manpower check by the Production Urgency Committee has established in each plant that denial of the increases would not make available any appreciable number of workers of the type needed by more urgent programs either locally or for inter-regional recruitment.



o o o

AIR HAMMER: *This* 12,000 *lb. hammer pictured cogging a large ingot in the new hammer shop which has just gone into production at Rustless Iron & Steel Corp., Baltimore, has a piston force of* 57,000 *lb.*

o o o

Wage-Hour Officials Offer Consultation Service to Employers

New York

• • • **The Wage-Hour** and Public Contracts Divisions of the U. S. Department of Labor have just completed two years of work as agents for the War Labor Board, consulting with and advising the public in their wage and salary stabilization problems.

This was announced recently by Arthur J. White, Regional Director of these divisions at 341 Ninth Avenue, New York City, in reporting on what is now a regular service offered to everyone interested in making application for wage or salary adjustments, or obtaining information on the stabilization regulations.

A special unit operates in each Wage and Hour Office to answer questions, review applications, point out omissions, and in general, to advise on the manner in which any proposed wage or salary adjustment should be presented to the WLB. Employers and labor should feel free to avail themselves of these services, said Mr. White. The Divisions also have available for free distribution copies of printed material on wage stabilization problems.

The unit offices are open six days a week, and no appointments are necessary, said Mr. White. Other offices are located in Albany, Rochester, Syracuse, and Buffalo, N. Y., and in Newark and Camden, N. J.

For the country as a whole about 300,000 voluntary applications for approval of proposed pay adjustments have been serviced and passed on to the Regional War Labor Boards by the Wage and Hour and Public Contracts Divisions, under the Wage Stabilization Program.

Murray Presses Vinson For Approval of Steel Wage Decision

Washington

• • • CIO President Philip Murray made it clear in his Dec. 15 meeting with OPA Administrator Chester Bowles and Economic Stabilizer Fred M. Vinson that the steelworkers are insisting that the WLB order in the steel wage case be carried out.

Labor sources say that Mr. Bowles promised that his agency would report to the Office of Economic Stabilization on the price effect in steel of the WLB ordered wage increases of the shift differential, liberalized vacations and the adjustment of intra-plant inequities. It was asserted that Mr. Vinson told Mr. Murray that if the WLB order necessitated a price increase in steel he would be unable to allow the WLB awards under the stabilization laws.

OPA officials have hinted that the steel industry request for price increases may be favorably reported. At the same time, it was argued that the stabilization executive order 9328 stands in the way of the WLB order's fulfillment.

The executive order says in pertinent part: "Nor shall anything herein be construed to prevent such agencies subject to the general policies and directives of the Economic Stabilization Director, from authorizing reasonable adjustment of wages and salaries in case of promotions, reclassifications, merit increases, incentive wages or the like, provided that such adjustments do not increase the level of production costs appreciably, or furnish the basis either to increase prices or to resist otherwise justifiable reductions in prices."

Thus a question of interpretation of the executive order is raised between Vinson and WLB Chairman William H. Davis if Mr. Vinson is accurately quoted as saying he lacks authority under the stabilization laws to approve the wage increases if it is found that price increases would be justified.

The WLB order of Nov. 25 said that the decision was made effective only on certification by OPA that a price increase is not required, or upon approval by Economic Stabilizer Vinson, if a price increase is required.

It would then appear that the President would have to intervene to make WLB's order effective. However, WLB officials and sources close to Mr. Vinson assert that he already has this power.

A small across-the-board increase to compensate steel companies for the retroactive provision of the WLB order might be within the authority of the OES director, if recommended by Mr. Bowles, it is speculated. However, if the increases recommended by OPA are substantial, industry sources say that Mr. Roosevelt will have to say yes or no to the steelworkers.

Steel Price Relief Requested

Pittsburgh

• • • The steel industry, through the OPA Steel Advisory Committee, has requested price relief from the OPA. The action was expected (see THE IRON AGE, Dec. 7, page 109) in view of the increased costs that have been plaguing the industry for sometime.

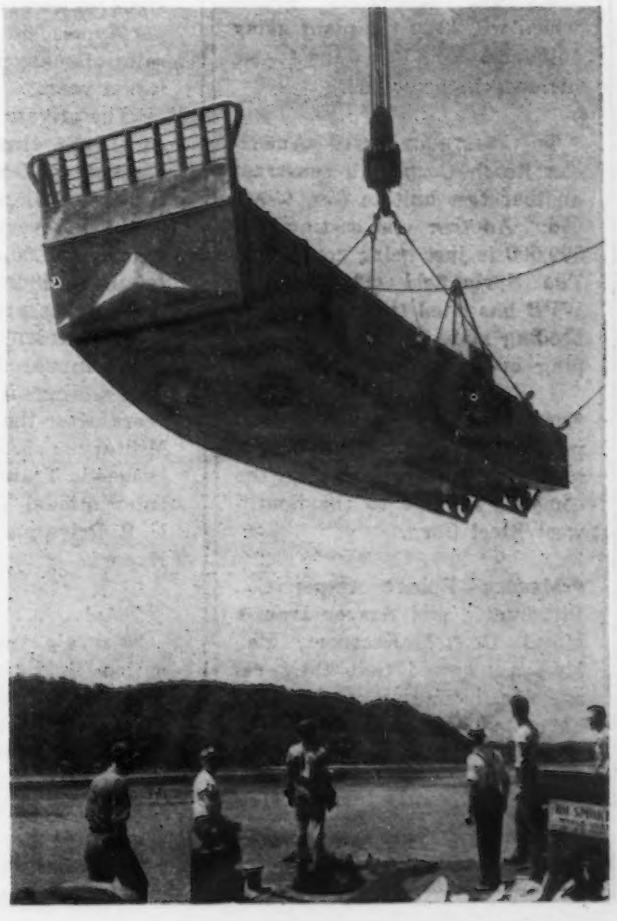
The price petition covers accumulated cost increases, increases to result from the wage award when granted and increases which will come from the retroactive feature of the wage award.

The adjustments, when and if made by OPA, will probably be on a product basis but the tenor of the steel industry's case suggests, if necessary, a request for an increase in the price ceiling of most or all steel items.

About four to five weeks will be consumed before all cost statistics have been laid before OPA it is said. The industry has asked for prompt action. In view of the attitude of OPA last March when the need for adjustments were looked upon with favor, OPA is expected to allow some type of relief.

The steel group claims the adjustment of steel prices is long overdue and requests that increases be granted on certain products, that reasonable information be furnished to OPA to substantiate the claims and that action on price relief be taken without regard to the WLB wage award. When and if the wage award becomes effective further application will be made in the broad framework of the petition to take care of increased costs resulting from the wage award.

o o o



READY FOR SEA DUTY: *LCM-3 built by American Rolling Mill Co. for either personnel or equipment was constructed in two factories in different parts of the country. It is now ready for a test run on the Ohio River.*

o o o

Industrial Briefs

• ACQUISITION—To fill rush orders for the ordnance departments of both the Army and the Navy, Rheem Mfg. Co. has taken over a substantial section of the huge Basic Magnesium plant at Las Vegas, Nev., to manufacture rocket projectiles and 81 mm. mortar shells. The rocket projectiles will be produced for the Navy and are a part of its recently announced program for spending $100,000,000 monthly for rocket ammunition. The mortar shells will be made for the Army.

• POSTWAR PLANS — Plans for the postwar manufacture of parking meters were announced recently by the Union Metal Mfg. Co., with the acquisition of assets of the Dual Parking Meter Co., Maryland. Union Metal's current production is devoted to the war effort.

• AWARDED CONTRACT—International Silver Co., Florence, Mass., has been awarded a contract for incendiary bombs which will keep the plant going full from Jan. 1 to June 1. No increase in personnel.

• TO CONSTRUCT UNIT—American Bosch Corp. will construct another test unit to cost $500,000. Another one costing $1,500,000 is just being completed. The Springfield office of the WPB has cited the company as needing more grinding and lapping operators.

• NEW NAME—Southwest Compressed Steel Corp., Pittsburgh, has announced a change in the company's name to the Southwest Steel Corp.

• MERGER—Robert Amper Co., Pittsburgh, and Amper Iron & Metal Co., McKeesport, Pa., have announced that their respective businesses and assets have merged with those of Southwest Steel Corp. Robert Amper and Harry N. Cohn have been elected to the board of directors.

Aircraft Outlook Declared Promising by Commerce Official

Boston

• • • **"Although the shrinkage** in aircraft manufacturing will be greater than in almost any industry other than the purely ordnance industries . . . the outlook is not so uniformly black as many would have us believe." This statement is made by William A. M. Burden, Assistant Secretary of Commerce, writing on the "Postwar Status of the Aircraft Industry" in the Harvard Business Review.

"Unless the American public becomes utterly blind to the lessons of history," Mr. Burden goes on to say, "America will have an infinitely stronger air force after the war than it had before; consequently we can expect that the purchase of military aircraft will not stop with the signing of the armistice but will continue at a much higher rate than before the war. Although conventional military transports will meet the majority of our transport requirements for the first five postwar years, within a two-year to four-year period new designs now underway should be developed to the point of production, and these designs will make enough prewar transports obsolete to provide transport sales of many tens of millions of dollars a year.

"The private flying market will soon equal the transport market in importance and within ten years after the war will probably far exceed it. There is every reason to expect a healthy and flourishing aircraft manufacturing industry several times as large as its prewar size."

Mr. Burden breaks down the possible annual sales of the United States aircraft industry within five years after the war as follows:

Military	$1,000,000,000
Domestic Transport	110,000,000
International Transport	20,000,000
U. S. Private	100,000,000
Exports	40,000,000
Total	$1,270,000,000

"For air transport companies the outlook is considerably clearer than for aircraft manufacturing companies. Improved service, increased safety, and decreased rates should assure a continuance of the sharp and steady growth in air transport which was developing before the war. Conservative authorities expect that the volume of passenger traffic will be four times what it was in 1941 within five years after the close of hosilities, and that ten years after the war it may be doubled again. In other words, the 1941 revenues, domestic and international, which totaled $135,000,000 might be expected to increase to about $540,000,000 by the first five years after the war."

"In short, there is every reason to believe that the postwar aircraft industry as a whole will be a far from insignificant factor in the American economy," says Mr. Burden, and he points out that the manufacturing and transport branches together "would require employment of some 346,000 persons, a figure which would be swelled greatly by the employment in miscellaneous aeronautical activities such as servicing, training, airport operations, and the like."

British Are Placing Steel Housing Needs

Pittsburgh

• • • **Working through the** Foreign Economic Administration and the Federal Housing Administration, a temporary emergency housing commission of the British supply mission very recently sought means of developing sufficient materials in the United States for the construction of some 50,000 homes in England to relieve acute housing problems. It is estimated that 250,000 homes are needed immediately in Great Britain to take care of emergency housing, and the British apparently desire to produce 200,000 of these houses in England. The materials for the remaining 50,000 will be obtained in this country.

The immediate question to be decided at the meeting in Washington with the U. S. Government officials was whether or not wood or steel would be more readily available for this work. It was decided that for delivery during the first quarter of 1945, steel would be far more readily procurable than would plywood.

The houses apparently will be of sheet panel construction, two sheets in thickness. They will be approximately 25 ft. square by about 7.5 ft. high, and will use 24 gage sheet. On this basis, there will be some 65,000 to 70,000 tons of hot rolled sheets required for the 50,000 houses.

Canadian Steel Ingot Output Reaches 92% in October; Pig Iron Gains

Toronto

• • • **Canadian production of** steel and pig iron showed gains in October over the previous month as well as for the 10 months of this year, according to the Dominion Bureau of Statistics. Steel output in October rose to 92 per cent of capacity against 81 per cent in the month immediately preceding, while pig iron output at 66.7 per cent compares with 62.9 per cent in September.

For October production of steel ingots and castings totaled 275,524 net tons, which compares with 242,725 tons in September and 271,976 tons in October, 1943. The month's output included 263,263 tons of steel ingots and 12,261 tons of steel castings. For the first 10 months of the year cumulative production of steel ingots and castings amounted to 2,512,005 net tons, against 2,509,712 tons last year and 2,580,715 tons, the all-time high record, made in 1942. This year's cumulative output included 2,392,341 tons of ingots and 119,664 tons of steel castings.

Output of ferro-alloys in October amounted to 15,631 net tons compared with 14,568 tons in September and 16,843 tons in October a year ago. For the 10 months ending with October production totaled 154,757 net tons compared with 185,480 tons in the same period of 1943 and 177,336 tons in 1942.

Pig iron production in October amounted to 154,119 net tons against 145,406 tons in September and 146,794 tons in October a year ago. Output in the month under review included 123,076 tons of basic iron, of which 2649 tons were for sale and the balance for producing firms; 9916 tons of foundry iron and 21,127 tons of malleable iron, all the last two grades being for sale.

For the 10 months of this year cumulative pig iron production amounted to 1,566,504 net tons, compared with 1,478,760 tons in the same period last year and 1,640,055 tons in 1942. In producing pig iron for the 10 months under review Canadian blast furnaces used 2,949,900 tons of iron ore and 86,720 tons of scrap iron and steel. During October eight furnaces were in blast and six blown out of the total of 14 stacks in Canada. In the production of steel for the 10 months, 1,256,992 tons of pig iron were used with 829,754 tons of scrap of consuming companies' own make and 706,546 tons of scrap purchased.

Canadian Railroad Programs Ambitious Postwar Innovations

Toronto

• • • **Canadian Pacific Railway** Co. has called tenders on the following new rolling stock. Thirteen diesel-electric switching locomotives; five roomette sleepers; 35 light-weight coaches; 10 baggage express cars, and 50 cabooses. The bids are for the building of the steel frames of coaches and sleepers with the finish to be applied by CPR at its Angus Shop at Montreal.

According to a report from Montreal, Canadian Pacific Railway cars of the future will contain more aluminum and less steel so as to save in weight and at the same time provide other advantages. The company stipulates that in future passenger coaches to be built, alloy steel and aluminum are to replace carbon steel. The new coaches also will be air conditioned, have advanced lighting, and there will be liberal use of new plastic products. The new roomette sleeping cars will be the first of this special type for the company. Officials state that specifications have been developed from experiment with rebuilt cars and based on research into comfort requirements. Each of the new roomette cars will have five double bedrooms, improved over previous CPR accommodation, as well as 10 roomettes.

In the passenger coaches it was said the use of aluminum and steel alloys replacing carbon steel will result in the saving of 5000 lb. of weight in each car. Seat accommodation will be based on results of a survey, during which many persons were measured and interviewed.

The diesel engines ordered will be similar to five delivered in 1943 and 10 received this year, with the 1944 deliveries being part of an order for 82 engines, steam and diesel-electric, of which 55 have been received by the company to date. The new sleeping, passenger and baggage express cars are in addition to 1150 freight cars ordered last August for 1945 delivery, which included steel sheet box cars, overhead refrigerator cars and drop-end gondola cars.

Detinning Gets Subsidy

Washington

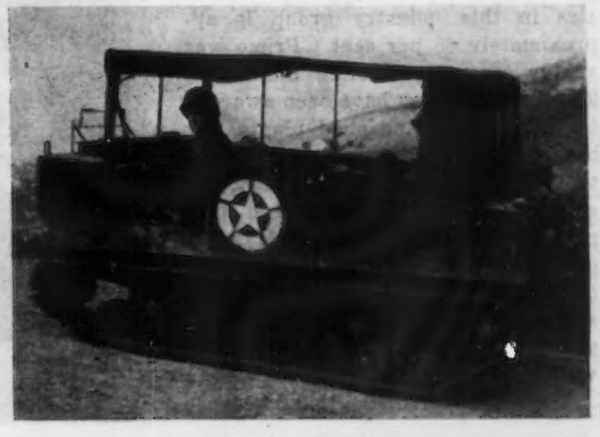
• • • **Acting upon a WPB** request to take steps to insure the continued collection of tin cans for the purpose of recovery of tin needed in the war effort, MRC has agreed to pay subsidies to detinners up to a maximum of 13c. a pound for all tin produced. This subsidy, said an announcement by Secretary of Commerce Jesse H. Jones, will compensate them for their loss in revenue on scrap steel recovered.

A recent decline in the price of scrap steel, it was stated, had caused companies operating detinning plants on used tin cans to consider reducing the prices which they, in turn, pay for tin cans collected by salvage committees in all parts of the country. As the result of the subsidy agreement, it was pointed out, detinners will be able to maintain purchases of tin cans on their usual basis. These arrangements, the announcement said, are expected to continue in effect

o o o

DEBUT IN ITALY: ***The Weazel, officially designated as T-24, Cargo Carrier, Light, makes its first appearance with the Fifth Army in the Quinzano area in Italy.***

o o o



Prewar Status Seen In Midwest Industry Following Conversion

Chicago

• • • In contrast to portions of the country whose prewar-postwar industrial status change will be from caterpillar to butterfly, the pattern of midwest industry probably will resemble strongly that which existed before the war, the Federal Reserve Bank believes.

Productive capacity of the midwest possibly will be larger by one fifth, the bank states in its current review, but the economy still will be dominated by automobiles, food products, iron and steel, and machinery.

In 1939 the Seventh Federal Reserve District States, Illinois, Indiana, Iowa, Michigan and Wisconsin, had at least 100 million dollars of products in 18 peacetime manufacturing groups as classified by the U. S. Bureau of the Census, the bank reports. Roughly two thirds of the production was concentrated in automobiles, food, iron and steel and machinery. Industrial production in the five states, which amounted to 13.5 billion dollars in 1939, reached 22 billion dollars in 1941 and 35 billion in 1943, it is estimated. A total industrial production of approximately 25 billion dollars in the first full year after the war with Japan is used as a basis for judging the relative importance of probable postwar shifts among the industry groups in the area in a graphic study by the bank. It is pointed out that in 1943, aircraft and ordnance accounted for more than 25 per cent of total production, rising from practically nothing, but their star is expected to wane with the war.

The bank estimates that about three fourths of wartime iron and steel facility expansion will be usable in civilian production if demand is sufficiently large, and points out that government ownership of new facilities in this industry group is approximately 65 per cent. Prime war supply contracts totaling more than 900 million dollars have been awarded to district iron and steel plants, but because of the ferrous metals used extensively in most types of heavy war equipment, it is acknowledged that prime contracts reflect only a small portion of volume of production. More than 440 million dollars in iron and steel making facilities have been added to midwest capacity during the war.

The bank predicts that, because shipbuilding now is the largest consumer of steel, demand will decline with curtailment of the shipbuilding program, although demand is expected to remain relatively high. The bank chalks up as adverse factors for the industry, the excess of capacity over expected civilian demand and "some competition from light metals and plastics." It is hinted that possible abandonment of some obsolete equipment will aid supply demand relationship.

Machine tool production well below current level is acknowledged as probable following the war with Japan and completion of most industrial conversion. During the conversion period considerable demand is expected for retooling plants, but this period will be characterized by greater benefit for specialized rather than general machine producers, the bank agreed. Machine tools constitute about one third of the non-electrical machinery group of industry whose production has increased more than three times since 1939, when it ranked fourth among district industries.

"Engines, turbines, industrial and farm machinery, tractors and domestic machinery appliances generally will be in heavy demand throughout the conversion period and for at least a year thereafter, assuming favorable general economic conditions and export prospects," the review declares.

The bank does not commit itself heavily on the period following the first year after the conversion.

In the non-ferrous metal group, the bank finds that probably less than half of new facility expansion, exceeding 200 million dollars in cost, will be used in the postwar period, because of decline in the aircraft industry and expected competition from light steels and plastics. The short-run production outlook for non-ferrous metals may be only moderately better than during 1941, the review states, placing growth of total output during the war at a level nearly three times prewar.

Jet Propelled Bombs Are Now Manufactured By Willys-Overland

Toledo

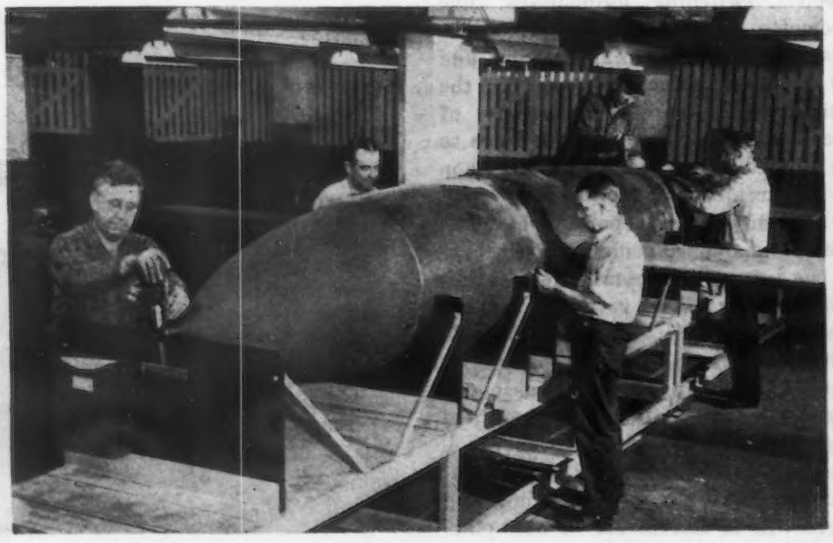
• • • Production of jet-propelled robot bombs, the American counterpart of the Nazi V-1 buzz bomb, has begun in the Aircraft Division of Willys-Overland Motors, it was announced recently by Charles E. Sorensen, president.

Mass production facilities were installed and production operations on the aerial bombs were under way 60 days after receipt of the contract, Mr. Sorensen revealed.

The robot bomb, shipped from the Willys plant complete except for engine and controls, has a sleek, streamlined fuselage 27 ft. long and stubby wings with a span of 17 ft., he explained. In two sections, the wings are mounted on a bar which passed completely through the center of the fuselage.

The fore-section houses the magnetic compass and gyro equipment and a windmill timing device which is set to throw the plane into a spin when it reaches its target, Mr. Sorensen said. In addition, the fore-section contains the war head, which holds the robot's explosive charge.

"Gasoline fuel tanks which give the ship a range of about 150 miles are located amidship."



Feud on Air Force Precision Bombing Theory Gets Another Blast

New York

• • • **The long famous** American Air Forces theory of precision bombing is recalled to mind by recent publication of photographs of the Norden bomb-sight. Considerable has been written in the past on both sides of the ocean, for example the following items from *Aero Digest* and from *Aircraft Engineering*, technical journal of British aeronautical engineers.

On March 15 of this year *Aero Digest* said:

"That Allied air supremacy will be the deciding factor in the success of this vast undertaking goes without saying. Without it 'Festung Europa' would be, in fact, impregnable. Nor is this any the less true in view of the mediocre results of the R.A.F.'s earlier scheme of bombing Germany completely out of the war from the air. The fallacy of the victory 'through air power alone' idea was a lesson learned at bitter cost in recent months. Germany has taken the worst beating in history and is still strong and defiant. . . . Reliance on bombings to destroy Germany's industrial productiveness has not been justified. Most factories can be reconditioned within three months after the most effective aerial blasting. Communications are repaired nearly as fast as they are destroyed. . . . To kill the will to fight is another objective that has gone by the board. Experienced troops cannot be knocked out by the aeroplanes and ordinary bombs, as revealed in Italy. . . . The old 'master plan' of the R.A.F. to bomb indiscriminately all factories and public utilities in the large industrial centres, had been adopted by the A.A.F. when it joined forces with the R.A.F. The plan was later modified, however, and while the R.A.F. continued to use area bombing at night, the A.A.F. started daytime precision bombing of targets missed in the night raids.

"The thought behind this strategy was to destroy Germany's capacity to produce fighting weapons and thus leave her defenseless. How dismally this has failed is well known."

In reply to this editorial, Aircraft Engineering brought forth a summary of comment, gleaned mostly from careful review of allied communiques for aerial warfare over several months, calling it "Beating the Drum":

"We have the greatest admiration for the high standard of the articles published in *Aero Digest's* technical supplement *Aviation Engineering*, and we have since the war on several occasions had to thank the Editor for his courtesy in granting us permission to reproduce some of them in these pages for the information of readers of *Aircraft Engineering*. But this is too much and we see no obligation on us, arising out of gratitude for past favours, to refrain from protesting against this unprovoked partisan assault.

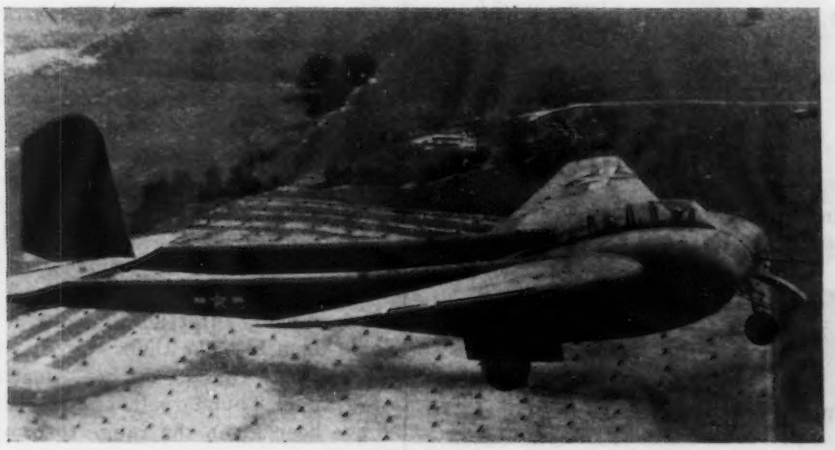
"One of the oldest wiles of the advocate is to invent an argument never voiced by his opponent and proceed to demolish it. What responsible person in Great Britain, within or outside the Royal Air Force, has ever subscribed to the 'victory through air power alone idea' or propounded 'the scheme of bombing Germany completely out of the war from the air?' We know of none. Indeed, the only individual, so far as we are aware, who has seriously put forward this fantastic proposal is Major Seversky—in a book published in the U.S.A. and supported in an American film.

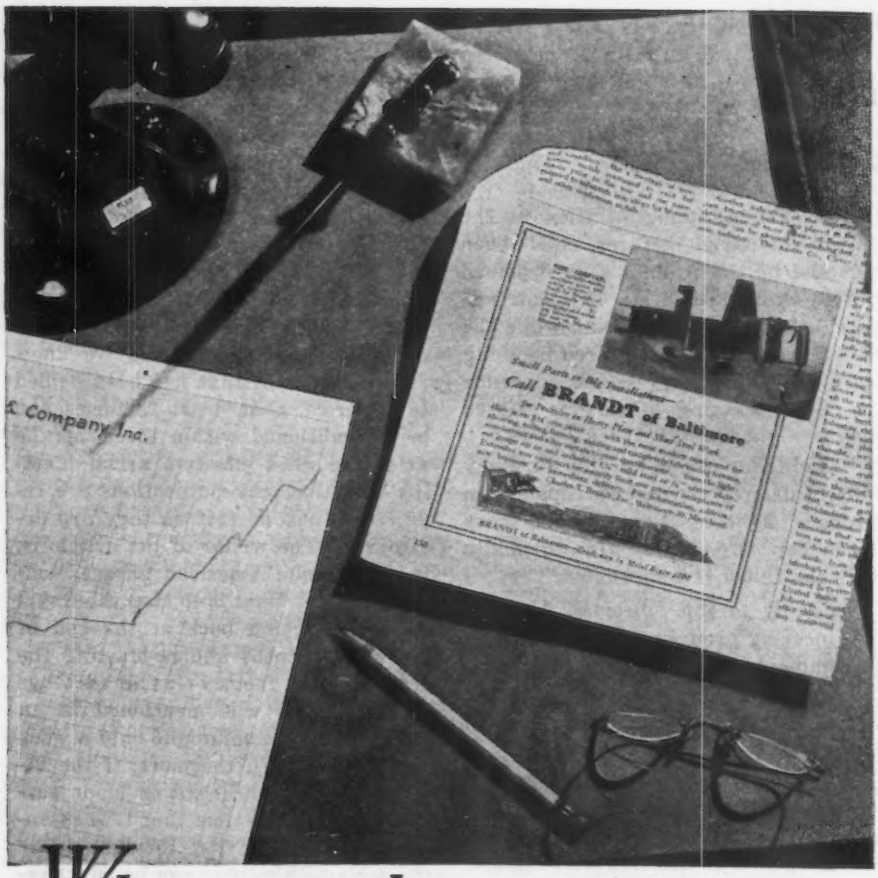
"It is perfectly true, as we know from experience that has been denied to America, that 'most factories can be reconditioned within three months after the most effective aerial blasting' and that 'communications are repaired nearly as fast as they are destroyed.' The writer of the article is, in picturesque American phrase, 'telling us.' But what is to stop the Royal Air Force going back at the end of the three months and re-blasting the reconditioned factory—as in fact has been done, as was mentioned in an Air Ministry communiqué only a week or two ago? Furthermore, if the attack on communications is made sufficiently near the time that it is essential to the enemy that they should be available to him they can be effectively disrupted over the vital period—as has been proved in France since June 6, when attacks on railway bridges and important points vitally interfered with the bringing up of German reinforcements at a crucial time.

"It is by no means certain that 'experienced troops cannot be knocked out by the planes and ordinary bombs'—or at any rate this was not revealed in Italy. The failure of the American attack on Cassino after it was hoped that the German troops had been 'knocked out' by bombing attacks by American Marauders was, according to our information, due to an unfortunate delay, said to be of 36 hours, between the termination of the raids and the start of the second assault, which gave the enemy time to bring in reinforcements under cover of the numerous gulleys and ravines which cut up the surrounding hills. The capture of Caen, on the other hand, was directly due to a heavy attack by British Halifaxes and Lancasters 12 hours earlier.

"With regard to the paragraph raising the old controversy between the relative merits of night and day bombing, it is quite time the myth of 'daytime precision' bombing was 'debunked.' As originally conceived it meant the bombing of individual targets from heights in the order of 30,000 feet and upwards. The effectiveness of this was disproved at Brest and it has also emerged that crews are un-

EXPERIMENTAL GLIDER: *Representing the first flying wing design for a glider displayed in this country, the XCG-16 was built by the General Airborne Transport, Inc., and is designed to carry six tons of cargo.*





Where can the BRANDT Fabricating Facilities *Fit Your Postwar Production?*

Your postwar production will probably include some fabrication to be done by a reliable, experienced metal-working organization. That's where Brandt of Baltimore can fill a definite need!

For over fifty years Brandt has fabricated metals for scores of industrial uses. Present products range from small formed units of only a few ounces to huge fabricated assemblies weighing up to 30 tons.

The Brandt 8½-acre plant houses complete, modern equipment for shearing, rolling, forming and welding. Machine capacities range from the lightest gauge sheet up to and including 1¼" mild steel or ¾" armor plate. All metals, ferrous, non-ferrous and alloy, can be completely fabricated to your specifications.

And if you've hit a snag on your postwar product, our designers and engineers will welcome the opportunity to assist in planning the details and specifications. Naturally all plans will be held in strict confidence. So if there are fabrication or design problems in your postwar plans, we invite you to discuss them with

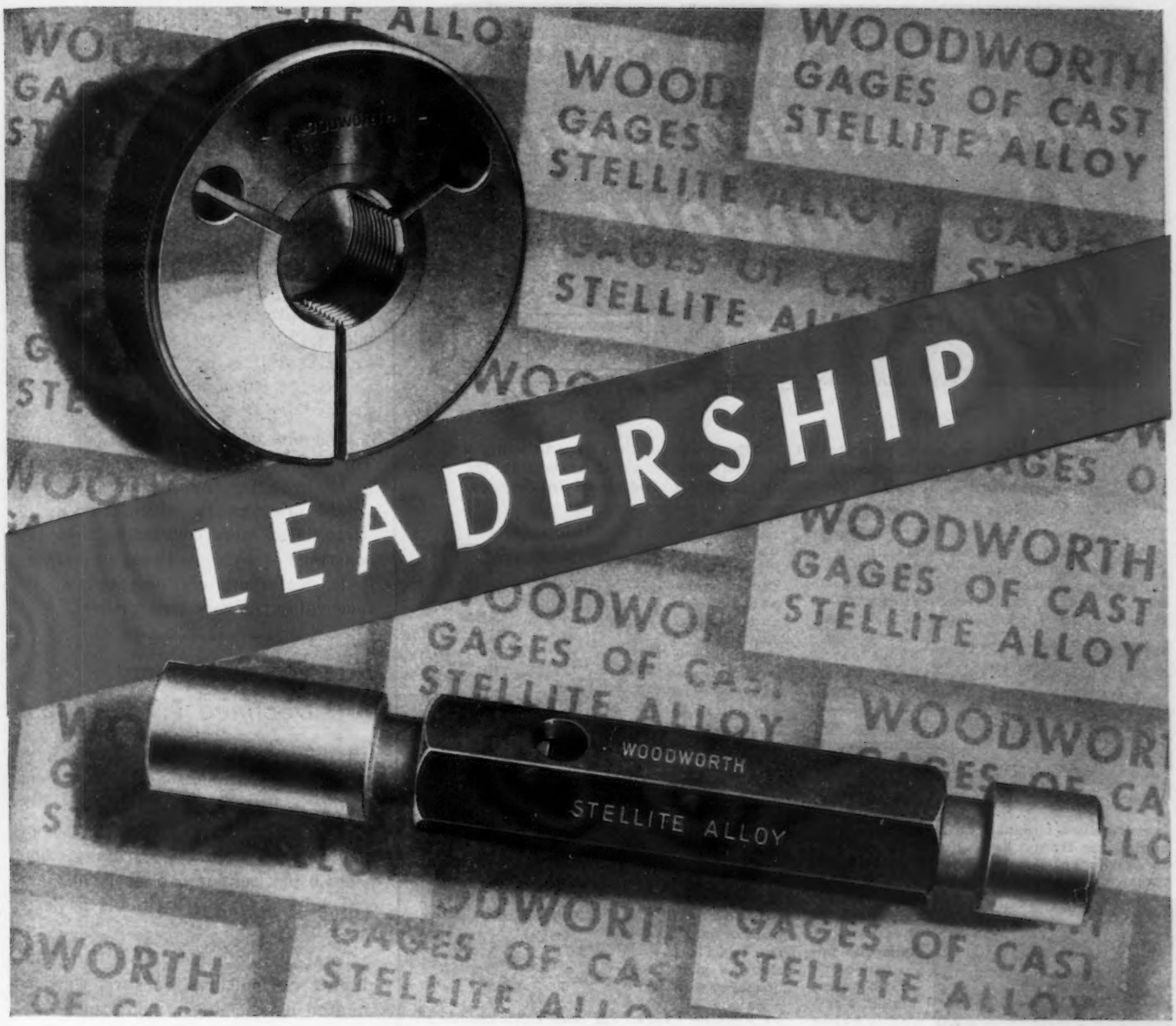
BRANDT of Baltimore

Charles T. Brandt, Inc., 1716 Ridgely Street
Baltimore 30, Maryland

BRANDT of Baltimore • Craftsmen in Metal Since 1890

able to withstand the conditions in Europe at these heights for long periods without facilities which are not, yet at any rate, available. We do not think those who live in America have the smallest conception of the weather conditions that prevail on this side of the Atlantic. The days on which the type of bombing visualized are possible are extraordinarily few, and even rare. At the time this is being written — in early July — for weeks past accounts of bombing operations by Fortresses and Liberators of the U.S. 8th Air Force have almost invariably contained the phrase, 'there was overcast above the targets and bombing was done by means of instruments'—it has even become the practice, on the rare occasions when it has happened, to refer to targets being 'visually attacked' in daylight by these heavy bombers. This being so, what difference in precision can there be between dropping bombs through cloud in daylight on an invisible target and dropping bombs at night on targets lit up by flares or outlined by target or marker bombs? We know which we should consider the more 'precise.'

"As, for purposes of defense against this unwarranted attack, we are committed to hitting back, we feel justified in raising another aspect of this controversial subject. Before us as we write are statistics of 'operations during June by U.S. 8th Air Force Flying Fortresses and Liberators.' These heavy bombers, it is stated, flew more than 25,600 sorties over Europe on which they dropped 52,360 tons of high explosive and incendiaries. In view of the fact that many of these expeditions, probably the large majority, were over distances involving flights to targets in the north of France, and therefore only some 150 miles or so from the bases in England, a bomb load averaging 2.04 tons per 18-ton or 20-ton four-engined airplane is not impressive. One would not charter the *Queen Elizabeth* to take a few sacks of grain across the Atlantic. Unescorted twin-engined Mosquitos of half the size have frequently carried the same load to Berlin, some three times the distance. The bomb-load of the American 'heavies' was believed to have been reduced in order to provide for the fitting of 13 machine guns to give a field of fire which would offer protection from attack in every direction in order to enable them to make their attacks without escort. In spite of this, American Lightings, Thunderbolts and Mustangs have been given the range to provide



From the day of their introduction to industry, gages of Cast Stellite Alloy by Woodworth have been earmarked for leadership. Today these tough, highly wear-resistant gages have attained leadership . . . through superiority *proved* in the service of industry.

Gages of Cast Stellite Alloy by Woodworth have a service life many times that of steel . . . gage life is increased up to 25 times. They are non-corrodible and non-magnetic, have a low co-efficient of friction, low affinity for other materials and a co-efficient of expansion close to steel.

Gages of Cast Stellite Alloy by Woodworth will remain accurate much longer than those made from any of 18 other materials tested.

Write for descriptive Folder No. 44-S.

ACCURACY YOU W CAN TRUST

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • PRECISION MACHINED PARTS

IS YOUR PROBLEM ONE OF *Transporting many Miscellaneous Items?*

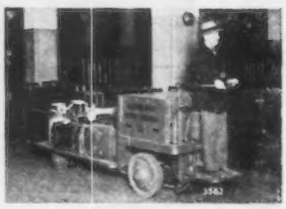
If you are faced with the problem of transporting, loading or unloading a wide variety of miscellaneous materials, you may find the answer in the actual case histories listed below. Many more are contained in the new Baker Catalog.

★ ★ ★

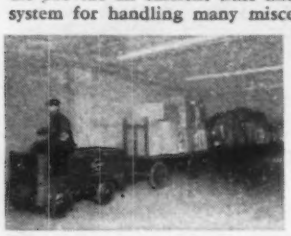
A Baker Tractor hauls multi-trailer trains of pallets loaded with a wide variety of products in the warehouse of the world's largest paint manufacturer. Pallet loads are removed from trailers by Baker Fork Trucks and tiered three high.

More than 10,000 separate items are received, sorted, stored and shipped—arriving from production at rates up to 60 per minute.

Baker Low Platform Trucks transport express and baggage speedily and efficiently in a large railway terminal. Nine Baker trucks in service at this terminal have, since 1930, traveled a combined distance of over 550,000 miles at a cost of 5c per mile—with a minimum of time out for maintenance.

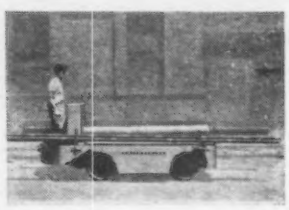


In warehouses, terminals, freight or express stations, Baker Tractors hauling long trains of trailers provide an efficient time and money saving system for handling many miscellaneous items.



Usually a single tractor keeps three sets of trailers in operation—while one is being hauled, a second is being loaded and a third unloaded.

Long bar stock, pipe, conduit and other unwieldy material is easily transported at a plant of one of the leading electrical manufacturers with a Baker Utility Platform Truck. The same truck handles a wide variety of other materials—in factory, yard and warehouse.



A large aircraft plant uses Baker Tractors to provide speedy, low-cost handling where a wide variety of production parts must be transported long distances to assembly operations. These materials are loaded directly on the trailers, since they do not lend themselves to the use of skids or pallets.

A large food warehouse saves many man-hours by using a Baker Low Platform Truck for loading and unloading cartons and packages of a wide variety of sizes and shapes that cannot be handled as unit loads on skids or pallets.

WRITE FOR YOUR COPY

Plant and production managers, traffic managers, superintendents, purchasing agents and any others concerned with material handling will find the new Baker Catalog No. 52 a valuable reference.

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Company
2175 WEST 25th STREET • CLEVELAND, OHIO
In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

an escort for the Fortresses and Liberators in large numbers whenever they penetrate into enemy occupied territory. So much for the dream of daytime precision bombing by unescorted American bombers from high altitude.

"We are tired of being lectured from America and told how much better in every respect everything is done by that country. From the closer knowledge gained in the last four years we know that it is not true—whether in the design office, the factory or in the air.

"Victory in this war will not come 'through air power alone'; neither will it be brought any nearer by loud-voiced propaganda which, to the initiate, is no more convincing than the boastings of a child—though by others it is, unfortunately accepted at its face value. Hence this protest."

Illinois Employment Declined 1.0 Per Cent

Chicago

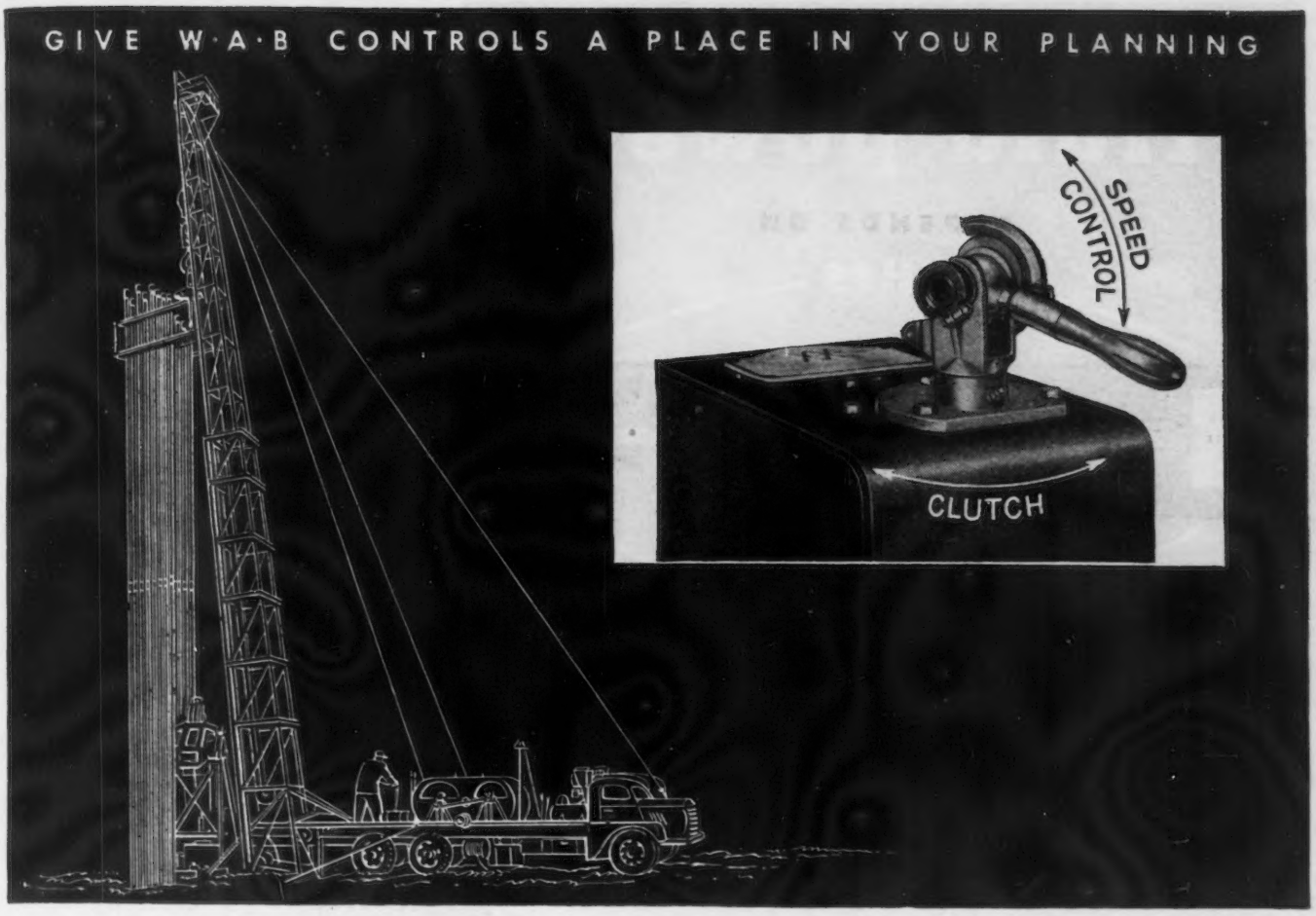
• • • **A contra-seasonal employment** decline in Illinois factories was recorded during September when number of employees is estimated to have dropped 1.0 per cent and payrolls 0.2 per cent, according to the Illinois Department of Labor.

Total employment in Illinois, including agricultural workers, was estimated by the department to be approximately 3,380,000 in September, or 40,000 less than August. About 18,000 of this estimated decline occurred in manufacturing industries and 12,000 in agricultural occupations.

The current August-September decline in agriculture is seasonal but the decline in manufacturing industries is not. During the last 21 years for which a sample group of establishments has been reporting to the department, employment in manufacturing industries was higher in September than during August for 15 years, and payrolls were higher in 12 years. The average seasonal changes between August and September for this sample group were increases of 1.0 per cent in employment and 0.4 per cent in payrolls.

The department interprets the decline as a reflection of the serious shortage of manpower. Labor shortage during the September-November period is estimated at about 83,000 workers in essential industries alone.

GIVE W·A·B CONTROLS A PLACE IN YOUR PLANNING



A "TWIST OF THE WRIST"

governs speed and clutch through

W·A·B controls

Here's a control that gives a new and literal meaning to an old familiar expression. For with an actual "simple twist of the wrist," the operator governs speeds and clutching on this modern oil service rig.

Swinging the control lever to right or left actuates the clutches. Moving the handle through a horizontal arc precisely varies the engine speed. This simple, positive, effective device is another example of the magic of air in solving remote control problems.

75 Years of Pioneering

1869 1944

W·A·B Remote control systems are handling all sorts of jobs, from simple "push and pull" up to entire series of interlocked operations. If you—in your present work or your post-war planning—have a place where an engineered, service-tested remote control system is needed, you'll find it profitable to give W·A·B devices a place in your planning.

Westinghouse Air Brake Company

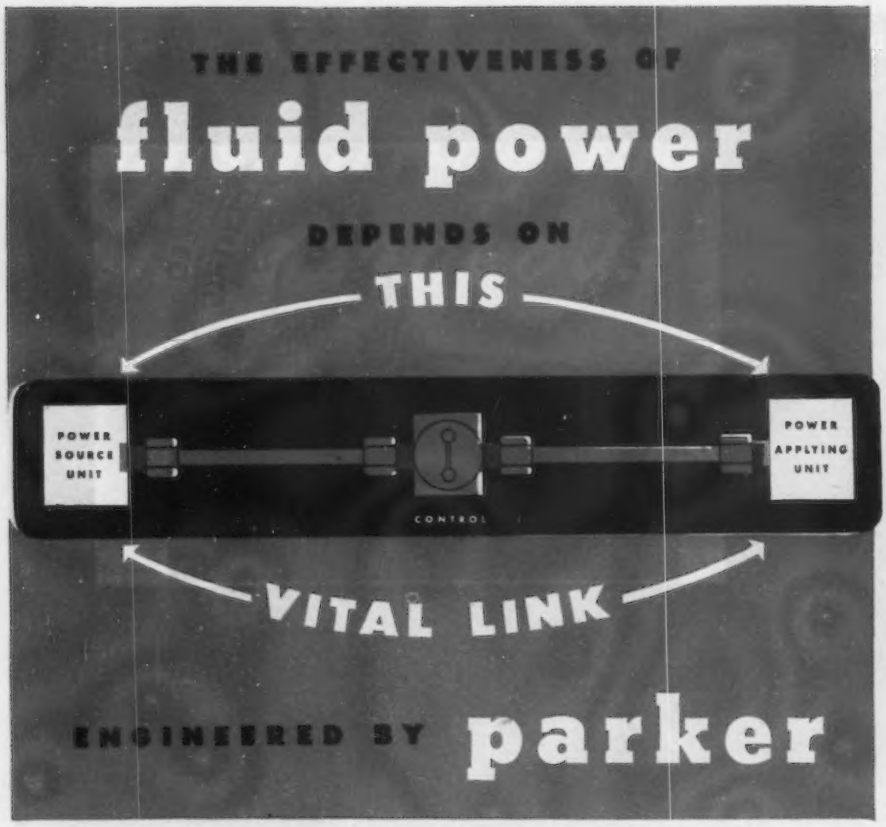
INDUSTRIAL DIVISION

General Offices: Wilmerding, Pa.

W·A·B

Pneumatic · Pneumatic Electric · Pneumatic Hydraulic

remote control systems



Be sure of the Circuit—the "vital link" between the source of fluid power and the device that applies it.

The Circuit carries fluid power around corners and into tight places—wherever you want it to go. It must be leakproof, vibration-proof, able to stand high pressures and resist corrosion.

Engineering fluid power circuits is a Parker job. Years of experience have showed us how to design them, how to build the necessary valves and fittings and how to plan sure-working installations.

Ask a Parker Fluid Power Engineer how you can use this modern form of power on your machines of today or tomorrow. No obligation—just write to The Parker Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

THE PARKER COUPLING is the key to the vital link, engineered and designed by Parker—protected against leakage and vibration, precision-made, quick to install, quick to service.

A. A. F. SURPLUS WAR STOCKS OF VALVES AND FITTINGS

Parker has been selected to distribute large A. A. F. Surplus War Stocks of Valves and Fittings. Immediate deliveries. For information, specifications, prices and installation help, phone, wire or write Parker Service Agency, a Parker subsidiary and agent for Metals Reserve Co., 17325 Euclid Avenue, Cleveland 12, Ohio.

PARKER
APPLIANCE COMPANY
CLEVELAND • LOS ANGELES
FLUID POWER ENGINEERING

J. L. Block Emphasizes Sound Foundations For Postwar Plans

Pittsburgh

• • • **Joseph L. Block, executive vice-president,** Inland Steel Co., speaking before the annual meeting of the Steel Products Warehouse Association, Inc., recently struck an extremely optimistic note on postwar planning, but emphasized strongly that such planning must rest on a firm foundation. He observed that there were certain fundamentals that must be observed if postwar plans are to succeed.

J. L. Block

"Cooperation" is fundamental number one, Mr. Block said. Voluntary cooperation is imperative, and, Mr. Block pointed out, this means, in essence, self-control and self-restraint. The jobbing business must of needs be in harmony with the steel business because they are dependent on each other. Another type of cooperation between buyers and sellers is that which can be exercised in time of acute demand. The placing of multiple orders that caused panicky situation, false backlogs and delayed delivery promises some months ago is an example of the lack of another type of cooperation. This idea of cooperation can be expanded through business into national, municipal and local affairs and into the field of labor and management.

"Clear thinking" was Mr. Block's second point. While Mr. Block stated he realized that many people figure their own thinking is clear and that of others is muddled, he believes there is plenty of room for clear thinking in working out postwar problems. He said that clear thinking in this case is that which is based on time and effort, research and study, and the dusting away of old cobwebs.

"Preservation of freedom" was the third and last fundamental that Mr. Block cited as a must for successfully carrying out postwar plans. While economic controls are a necessity during wartime, Mr. Block opposed such controls in peacetime. He said that

© 1944, HOUDAILLE-HERSHEY CORPORATION

Great day in the morning!

This country is coming out of the night with a great, new confidence in its own powers—attributable, in part, to the unbelievable miracles of American production.

That we can outproduce the world is no longer a vain boast—it has been proved, to the conviction of all, under the lash of war necessity.

This proved ability to produce vast volume, swiftly, bears a definite relationship to the world-wide vacuum of human need, which War's destruction has created.

America stands ready to satisfy this vacuum. America *can* satisfy it. And it logically follows that our national economic reward will be in proportion to the preponderant service we render.

That reward will be shared in, directly or indirectly, by every man, woman and child in the United States. It will be reflected in better living and greater home-happiness for our whole citizenship. This nation's new standards of living will beggar anything we have ever before known.

Thus, again, in peace as in war, America's well-being hinges on our power to produce.

HOUDAILLE★ will march with America's armies of Industry into the great new day, the glory of which is already bursting upon us.

BUY U.S. WAR BONDS

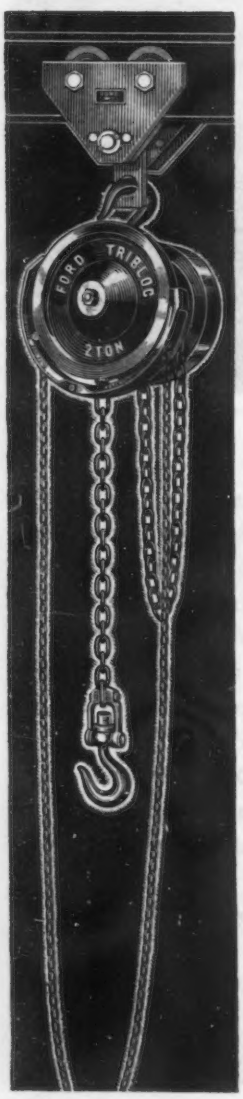
HOUDAILLE-HERSHEY CORPORATION

Executive Office—Detroit 26, Michigan

Manufacturers of precision parts and equipment for the automotive, aircraft, railway, maritime, mechanical refrigeration, radio and other industries

★*Pronounced:* **"HOO-DYE"**

FAMED FOR THRIFT



FORD TRIBLOCS have an amazingly long life. Given proper care—they are up on your ceiling for the duration of your plant. They are famed for thrift.

FORD TRIBLOCS are ideal for constant hard usage. Spur gear construction, ball-bearing equipped, and many other features that assure enduring efficiency, safety and low maintenance cost. Capacities: ¼ to 40 tons.

FORD SCREW HOISTS are built primarily for jobs on which smooth operation and accurate spotting of loads are required. Light weight; highly portable. Capacities ½ to 5 tons.

FORD DIFFERENTIAL HOISTS are constructed for intermittent service where speed, portability and price count. Capacities ¼ to 2 tons.

Order from your Distributor

FORD CHAIN BLOCK DIVISION

Philadelphia, Chicago, San Francisco, Denver, Los Angeles, Portland

ACCO

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT : CONNECTICUT

he has met business men throughout the country who favored the retention of certain specific wartime controls because they believe such controls have been an aid to their particular businesses. They have been antagonistic toward the lifting of these favored controls, but claimed that others were harmful. Mr. Block said this idea is a snare and a delusion. Free competition, Mr. Block stated, is vital to a progressive nation.

R. C. Todd, American Rolling Mill Co., said the services that the members of the association, which are for the most part secondary warehouses, rendered in disposing of off-grade products. He showed that in 1941 sheet production represented about 20 per cent of the steel output, amounting to about 12,000,000 tons. Normally, 15 per cent of the sheet steel production had to be disposed of in grades other than primes. Therefore, in secondary sheet steel products, there was a disposal of about 1,800,000 tons of sheets a year.

This service of taking side and end shearings, wasters, rejects and shopworn sheets into secondary warehouses and developing markets that can use these products has always been a vital service to both the mill and the consumer. This practice has served to keep the price of steel at its low level, has eliminated an operation problem in mills where accumulations would become a nuisance, and has made use of material that would otherwise be a complete economic waste.

Mr. Todd stated that these warehouses, banding together in an association, have strengthened their economic position. He echoed a statement by Herbert Hoover at the time he was Secretary of Commerce, which was to the effect that the day of individualism in industry had passed and the hope for future progress lay in associational activity. Unless such activity is developed voluntarily, with consequent standards of quality and codes of conduct that tend toward production economies and progress, Government will have to force it, even though less efficiently.

Sheet-Strip Chief Resigns

Washington

• • • **L. F. Miller**, St. Louis, Mo., has resigned as chief of the sheet and strip branch of the WPB Steel Division. Mr. Miller was associated with the division for more than three and a half years and is returning to a position in private industry.

SOLVE POST-WAR PRODUCTION PROBLEMS WITH

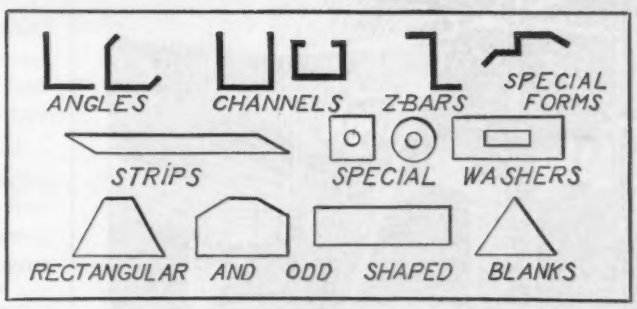
HARRISON SHEET STEEL

FABRICATING
FORMING
FINISHING

20 years of peacetime production coupled with 3 years of accelerated war production has given our company the "know how" to manufacture your peacetime sheet metal parts on a competitive basis. For complete satisfaction call on Harrison.

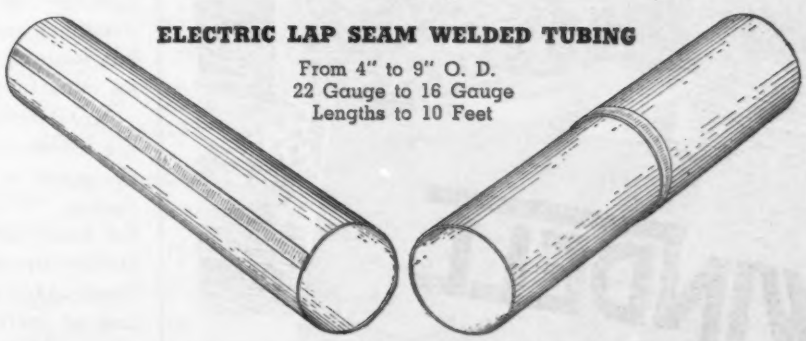
o

Our facilities include equipment not found in average steel fabricating plants — electric seam welders, automatic arc welding heads for continuous line arc welding and a completely conveyorized setup for degreasing, washing, rust-proofing, enameling and baking.



ELECTRIC LAP SEAM WELDED TUBING

From 4" to 9" O. D.
22 Gauge to 16 Gauge
Lengths to 10 Feet



■ PRESS BRAKE FORMING
¼" Capacity — 12 Feet Long

■ PUNCH PRESS OPERATIONS
Blanking and Deep Drawing Operations

■ SPOT WELDING
¼" Plate Capacity

■ SEAM WELDING
Circular and Longitudinal

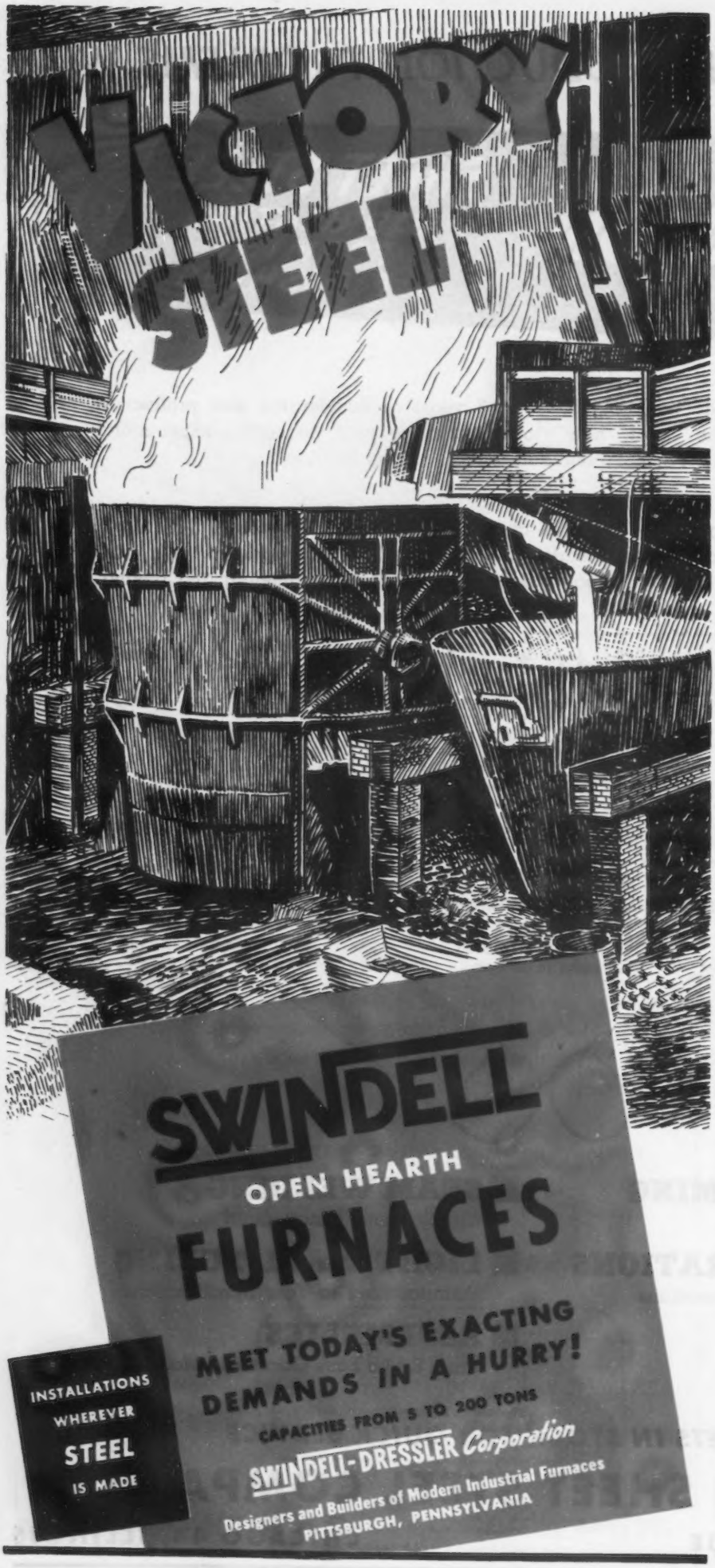
■ LIGHT WALL TUBING
Manufactured to Your Specifications

■ ASSEMBLIES
From Radio Base Chassis to Machine Housings

STEEL SHEETS IN STOCK FOR QUICK SERVICE

HARRISON SHEET STEEL COMPANY

4718 WEST FIFTH AVENUE **CHICAGO 44, ILLINOIS**



Batcheller Outlines Critical Programs To Tool Engineer Group

Washington

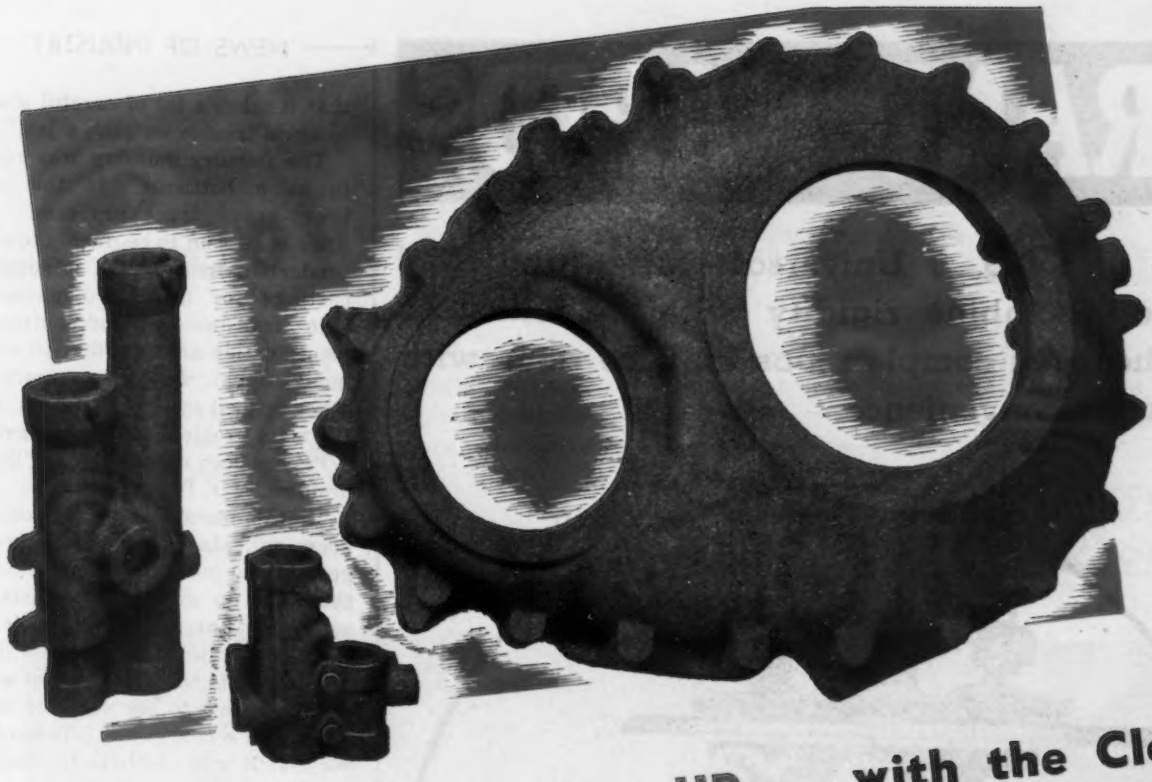
• • • **Pointing out that** this is a war of tools, which have made it possible for this country to raise production above the $5,000,000,000-a-month mark, Hiland G. Batcheller, WPB chief of operations, recently outlined to Potomac Chapter, No. 48, American Society of Tool Engineers, the critical programs whose production, he said, is super-urgent. In these programs Mr. Batcheller included heavy ammunition, heavy artillery, heavy-heavy trucks, tires, combat loaders, rockets, communication wire, cotton duck and other items.

What makes the production problem so difficult, Mr. Batcheller explained, is that "we are constantly called upon to adjust our schedules to meet changing requirements — changes in quantity and design based upon actual combat experience in the various war zones."

The causes of criticality were declared to vary with each program. In tanks, designs changes are significant, it was stated; in large trucks and bus tires, the sharp step-up was named as the big factor; in tactical field wire, facilities shortages were said to be dominant and in cotton duck and combat loaders, it was declared, labor is an important element.

Mr. Batcheller cited figures to show the enormous upsurge in demands as the result of battle experience. Last Spring, he said, Army requirements for heavy artillery ammunition were stepped up sharply as the result of the North African and Italian campaigns and of increased demands from our allies. At that time, he said, production was running at the rate of $27,000,000 a month. Already output has risen to 45,000,000 a month, but by March, 1945, this must be increased to $80,000,000 and it is probable, Mr. Batcheller added, that $100,000,000 a month must be reached later in the year.

"Making these shells requires more facilities—more facilities," Mr. Batcheller said. "The manufacture of a 155 mm. shell by modern production methods requires more than 40 separate operations on 40 different machines, with two miles of conveyor systems between. This is a precision job. You, gentlemen, as tool engineers, know



Costs DOWN . . . Production UP . . . with the Closer Precision of Permite PERMANENT MOLD Castings

★ The price of an aluminum casting is often only a fraction of the cost of finishing it. And it is in reducing your finishing cost that Permite Permanent Mold Aluminum Castings offer you important savings. Permanent mold castings are more precise in dimension (tolerance is ± .01" against ± .03" in sand castings). And because every casting is poured in the same permanent metal mold, all castings are dimensionally uniform.

These cost-saving precision features mean less rough weight in the casting — less metal to remove. You do not have to readjust finishing machines to meet variations in the castings. Even automatic, multiple-operation machines can be safely used with Permite Permanent Mold Castings. You may also have fewer surfaces to machine; the finished cost per casting is often surprisingly low.

Aluminum Industries' first products — 25 years ago — were permanent mold aluminum castings. Today, no foundry is better equipped to turn out castings of this superior type. Experience has given us a thorough knowledge of aluminum and its alloys. And the specialized knowledge of our engineering staff is always at your service. We shall be glad to submit recommendations, upon request.

ALUMINUM INDUSTRIES, Inc.
CINCINNATI 25, OHIO

Detroit: 809 New Center Building
Los Angeles: 324 North San Pedro Street
Chicago: 616 South Michigan Avenue
New York: 9 Rockefeller Plaza

PERMITE ALUMINUM ALLOY CASTINGS

GRAND RAPIDS

No. 4 and No. 5 Universal Cutter and Tool Grinders combine rigidity with flexibility so that the most complex jobs may be done with maximum convenience.

GRAND RAPIDS NO. 4 MOTOR DRIVEN UNIVERSAL CUTTER AND TOOL GRINDER WITH POWER FEED TO TABLE

These No. 4 and No. 5 machines are obtainable with power feed and with provision for wet grinding making it possible to handle the occasional job of internal or cylindrical grinding advantageously.

Send for Bulletin #1243.

Reasonably prompt delivery.

GALLMEYER & LIVINGSTON CO.

200 STRAIGHT AVE., S.W.

GRAND RAPIDS 4 MICHIGAN

that it takes a lot of careful planning to avoid trouble on such a job."

The foundry industry was referred to as a bottleneck in the critical heavy-heavy truck program. Foundries were said to be unable to expand production fast enough to supply the castings for a full complement of axles, transmissions and engines. The identification and distribution of castings so that they go to trucks and other critical programs was said to be the main problem. A special group in WPB has been established to "lick this problem," Mr. Batcheller said.

"In this immediate period tool engineers will play an important role in getting out new facilities, in setting the tools up and in supervising the workers in operating those tools," Mr. Batcheller said. "And they will also play a role in the period when we find ourselves able to use some of our resources in reconversion. Toward that end, WPB will continue to study the problems which will beset the American economy when war production is no longer necessary at current high levels. In the meantime, we have to tackle these critical programs one by one and lick them."

New Contracts Beat Cancellation Total

Cincinnati

• • • More than 130 new war contracts a month are flowing into the Cincinnati Ordnance District to meet the need for more fighting equipment, according to Col. J. C. Shouvlin, district chief.

"Since the first of the year, about 1660 new contracts have been awarded for a money value of approximately $74,500,000," said Colonel Shouvlin. "At the same time, only 334 contracts have been terminated."

Asserting that contract terminations have had little or no effect in this area, Colonel Shouvlin pointed out that there are outstanding 1207 prime contracts and purchase orders worth $837,000,000, which is $174,000,000 greater than contracts in existence at the first of the year.

Colonel Shouvlin stated that nearly $500,000,000 worth of fighting equipment has been accepted and shipped from this area since the first of the year, including such items as shell, rockets, tanks, bombs, sub-machine guns, trucks and ammunition components, and that requirements now foreseeable for 1945 do not indicate any major reduction in war production.

Instruments

OF WAR AND PEACE!

These fittings don't look deadly, do they? But because they are indispensable to virtually every unit of the nation's mobile fighting machines—whether on land, sea, or in the air—they are as effective equipment as exists in the war!

Throughout the war, the four plants of The Weatherhead Company have produced these vital parts at the rate of more than a million a day—and will be prepared to devote their entire facilities to peacetime production in many fields when the Day of Victory comes.

FREE: ***Write on company letterhead for "Seeds Of Industry"—a history of The Weatherhead Company, its many facilities and diversified products.***

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

Plants: Cleveland, Columbia City, Ind., Los Angeles Canada—St. Thomas, Ontario

WILL DRAW, BEND, AND FORM WITHOUT FRACTURE

Parts and stampings will have a uniform coating on the inside AND outside when crackproof, peelproof nickel coated Thomastrip is used. When buffed, the lustrous surface may be used as a final finish or as a base for further plating.

Nickel as an electro coating on Thomastrip provides four functional advantages: (1) protection against rust and corrosion during the course of manufacturing; (2) protection against scaling during heat treating; (3) a non-ferrous coating over a ferrous base metal; (4) sufficiently ductile surface to provide surface qualities that are necessary for the particular application.

With nickel coated Thomastrip, you may be able to replace more costly metals without loss of production or quality. Write today for further details of precoated Thomastrip stating your individual needs.

BRIGHT FINISH NOT COATED, SOLDER COATED, ELECTRO-COATED WITH NICKEL, ZINC, COPPER, BRASS, AND LACQUER COATED—IN COLORS

THE THOMAS STEEL CO. • WARREN, OHIO
SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL

Navy Seabees Build A Shearing Machine From Scrapped Parts

Washington

• • • **The Navy Department** continues to receive frequent reports on the ingenuity of the Seabees in constructing needed machinery from discarded parts and scrapped material. One of the latest examples is a shearing machine heavy enough to cut reinforcing steel and bolt stock up to 1 in. in diameter which has been built from scrap parts by Navy Seabees at a Pacific base.

Chief Carpenter's Mate M. H. Palm, USNR, drew a working sketch of a standard-make machine from memory. L. W. Patterson, Motor Machinist's Mate First Class, USNR, was responsible for the mechanical assembly. R. W. Shaw, Ship Fitter Second Class, did much of the actual "manufacturing."

The cutter is described by Palm as a 200-to-1 ratio multiple machine with a lever operating pressure of 18,000 lb.

"Its principal feature," he says, "is the position of the operating handle. Simply by changing the position of the ratchet, the handle can be released from the usual 180 deg. arc to one of 90 deg. or less. The size of the stock predetermines the opening between the cutting jaws.

"The first reduction is obtained by the use of a spur gear and pinion from a truck differential; the second reduction is made by the use of an AC Mack truck chain and drive sprocket which in turn is transmitted to a first class lever."

Kennametal inserts on die and ram
KENNAMETAL
Pin and bearing of Kennametal
Chuck jaws of solid Kennametal
Needle valves and cones tipped with Kennametal
Kennametal-tipped "slow-up" valves
Mortar and pestle tipped with Kennametal
Pump valve ball and seat of Kennametal
Bushings of solid Kennametal
Kennametal contact points

Just to give you an idea . . .

. . . HOW AMERICAN INDUSTRY IS IMPROVING THE PERFORMANCE OF ITS PRODUCTS BY EFFECTIVELY USING KENNAMETAL'S UNIQUE WEAR RESISTANT PROPERTIES—DIMENSIONAL STABILITY, LOW COEFFICIENT OF FRICTION, AND EXTREME RESISTANCE TO ABRASION, CORROSION, EROSION, AND OXIDATION BY ELECTRIC ARCS.

These typical applications are shown to suggest how *you* may employ Kennametal—the metal that masters wear—at critical points in *your* products and production machinery. Kennametal is available in a variety of standard shapes, and it can be accurately molded into many special forms. Particulars are yours for the asking.

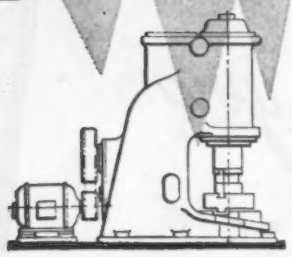
KENNAMETAL

SUPERIOR CEMENTED CARBIDES

TRADE MARK REG. U. S. PAT. OFF.

KENNAMETAL *Inc.*, LATROBE, PA.

NOW IS THE TIME TO STOP COSTLY VIBRATION TRANSMISSION with KORFUND VIBRATION CONTROL



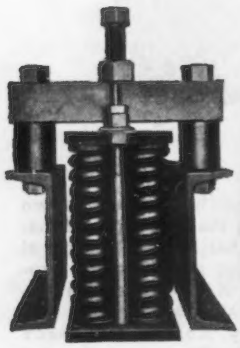
The ideal time to isolate vibration is when new equipment goes into place or old equipment is shifted to a different location in the plant. But in most cases it will pay to attack the problem without delay, even though production schedules may be upset. The delays are likely to be inconsequential in comparison with the damage resulting from uncontrolled vibration.

Korfund Vibration Control includes the use of every suitable type of isolating material. Rubber and natural cork, chemically treated to preserve its resiliency, are effective mediums for some installations. But for power hammers and punch presses the surest, most flexible, controllable and permanent method is found in the use of coiled springs as employed in Korfund Vibro Isolators.

These units consist of groupings of cold-rolled, oil-tempered, crucible-steel springs in metal housings. Various combinations and sizes are available for supporting loads of from 50 to 30,000 lbs.

Do not close your eyes to the destructive effects of uncontrolled vibration from impact machines. Korfund's more than forty years of experience in solving difficult vibration problems are at your service.

Write today for full information. No obligation.

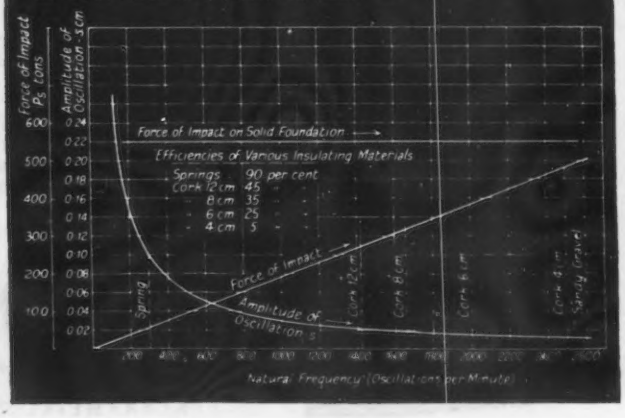


Typical Korfund vibration control unit.

THE KORFUND COMPANY, INC.
48-35 Thirty-second Place, Long Island City 1, N. Y.
Representatives in Principal Cities

KORFUND VIBRATION CONTROL

Curves showing force of impact on sub-base and relative efficiency of various materials when employed for isolating the foundation of a power hammer.



Various Financial Aids Seen Available For Conversion Interval

By LIEUT. MENO LOVENSTEIN, U. S. ARMY, ARMY INDUSTRIAL COLLEGE

Washington

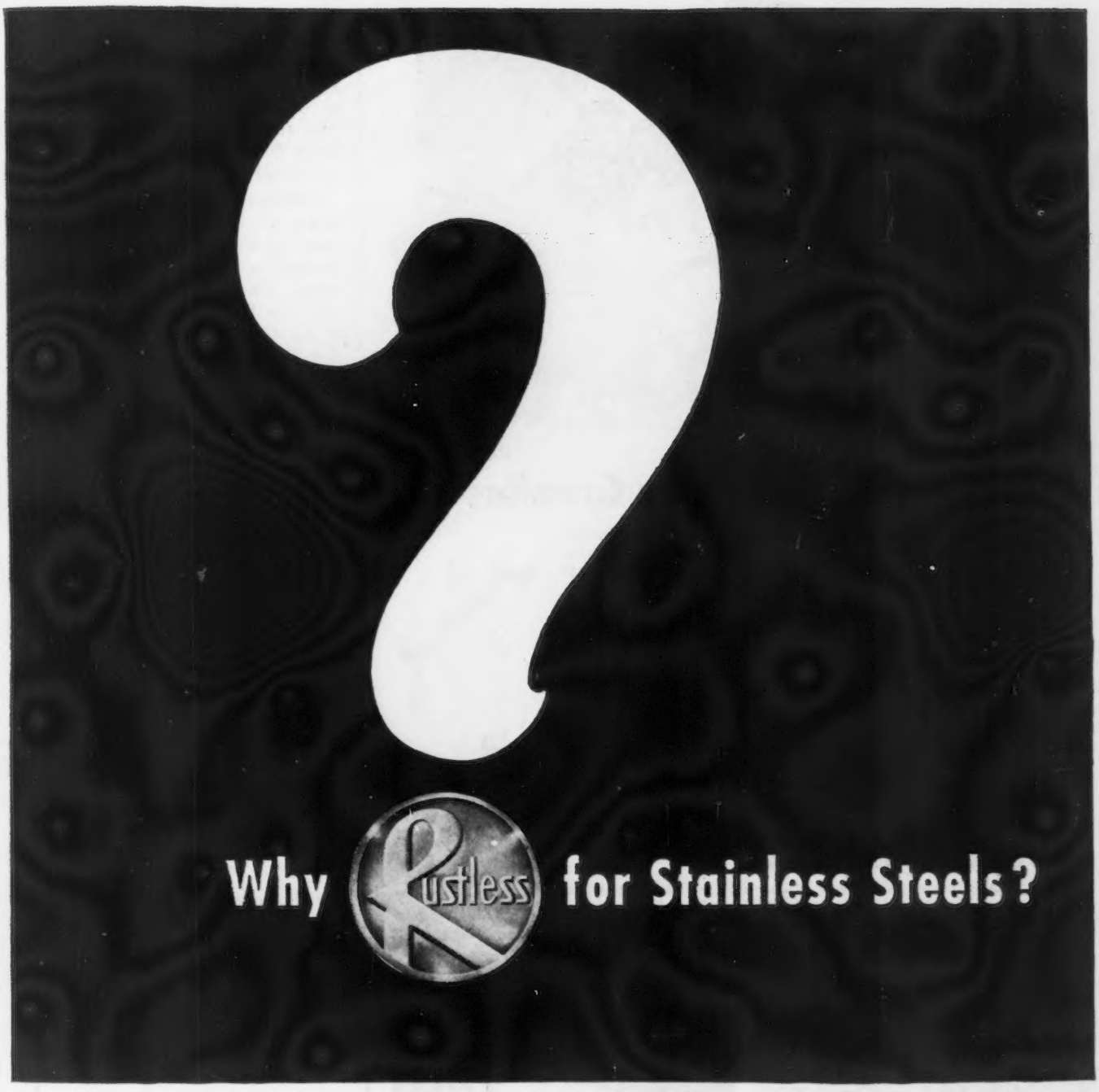
• • • **Victory over Germany** will result in a great number of terminations of contracts. The American people will soon face economic and financial problems perhaps equal to those presented by the war itself. However, experience gained in the last war and in this one has resulted in legislation which can and should save us many a heartache. Without impairing production still needed for the war, Congress is trying to make reconversion as simple and rapid as possible.

At the very best the complicated job of preparing claims and settling them will take some time. However short, the delay in arriving at a final settlement will find many contractors hard pressed for cash. Every business stands midstream in the flow of incoming and outgoing payments. Termination cuts off the normal source of funds, but the responsibility of the contractor to make payments to his subcontractors still remains. Realizing the effect that terminations might have on the financial position of many businesses, the Contract Settlement Act prescribed that interim financing should be provided war contractors within thirty days after application has been filed.

Ed. Note: This brief of a recent supplement is made possible through the courtesy of the Army Ordnance Association for whom the complete article was especially prepared by Lieutenant Lovenstein.

Contract financing sections have been, or will be, established in each procurement office and in each of the Ordnance District Offices to advise contractors and contracting officers on the various types of interim financing which are available and applicable. Moreover, contracting officers authorizing or approving payments will not be personally liable for mistakes of judgment or errors made in good faith. They will be liable only in the case of fraud.

Four types of interim financing are available to war contractors: (1) advance payments; (2) partial payments; (3) unguaranteed loans made by financial institutions; (4) loans made by financial institutions and guaranteed by the War Department, Navy Department, or other authorized



RUSTLESS has become one of the most important factors in the stainless steel industry.

One reason for this is that we specialize in the making of stainless steel, and experience has proved to American industry that it pays to deal with a specialist.

Our specialization has enabled us to work successfully with fabricators in solving manufacturing problems that involve machining, forging, cold working, welding, soldering, riveting, heat treating — or in selecting the proper type of stainless in order to obtain ease of fabrication and the economy of long, sometimes limitless life.

Your order, once you place it with us, is not just processed with standard alloy-steel mill equipment. We employ many added engineering features that bring stainless steel into uniformly useful form.

Rustless makes stainless steels in over twenty grades readily available, and not only delivers billets, bars and wire, but provides detailed technical assistance with their fabrication. If you want to know more about stainless — ask Rustless.

RUSTLESS

IRON AND STEEL CORPORATION

BALTIMORE 13, MARYLAND

Producing STAINLESS STEELS *Exclusively*

SALES OFFICES: BALTIMORE
BUFFALO • CHICAGO
CINCINNATI • CLEVELAND
DETROIT • LOS ANGELES
MILWAUKEE • NEW YORK
PHILADELPHIA • PITTSBURGH
ST. LOUIS • DISTRIBUTORS
IN PRINCIPAL CITIES

Gets rid of "Production Gremlins"

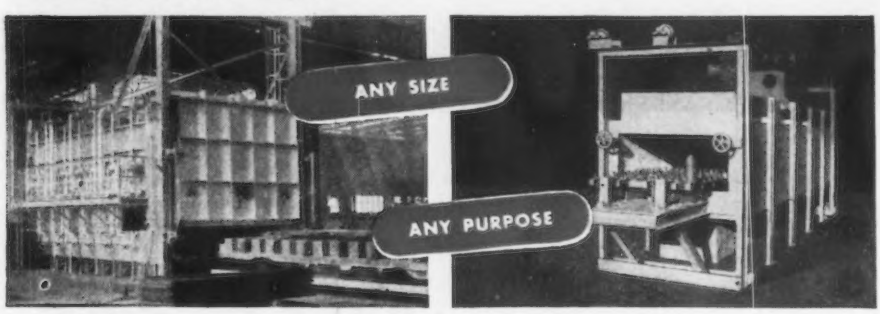
DO warpage, quench cracks, hard or soft spots, low physicals and non-uniform structure and hardness, increase your costs and interfere with your production? Then put your heat-treating problems up to Tate-Jones.

Here at Tate-Jones we have specialized in the fine art of *precision* heat-treating. By scientifically combining the proper heat-treating practice with the correct equipment we make it possible to get out of the steel *all* the desirable properties put into it by the steel maker.

Precision heat-treating is designed primarily to minimize or entirely eliminate re-treating. To give you improved and uniform physicals—uniform hardness and uniform structure. To materially increase machinability, sometimes as much as 100%.

Tate-Jones metallurgists are thoroughly familiar with Austempering, Martempering and Purnellizing. From their long, practical experience with these advanced heat-treating techniques they know how to select and apply whichever method will give *you* optimum results with best economy.

Our combustion engineers and furnace designers are experts in providing equipment, either standard or custom-built, to exactly fit your needs:—Oil and gas-fired furnaces of all types. Salt and lead pots. Oil tempering tanks of the latest types. All engineered to operate at maximum efficiency. Your inquiries will receive prompt attention.



For better results FURNACE ENGINEERS *in heat-treating*

TATE-JONES

and COMPANY, INC., PITTSBURGH (30) BOX 1016 PA.

Gas and Oil Fired • Pusher • Variable Speed Conveyor • Rotating Hearth • Car Bottom • Roll Down • Horizontal and Vertical Pit • Circular and Rectangular Pot Furnaces • Oil, Gas and Combination Burners

STEEL FABRICATORS

Equipment for Cycle Annealing · Austempering · Martempering · Purnellizing

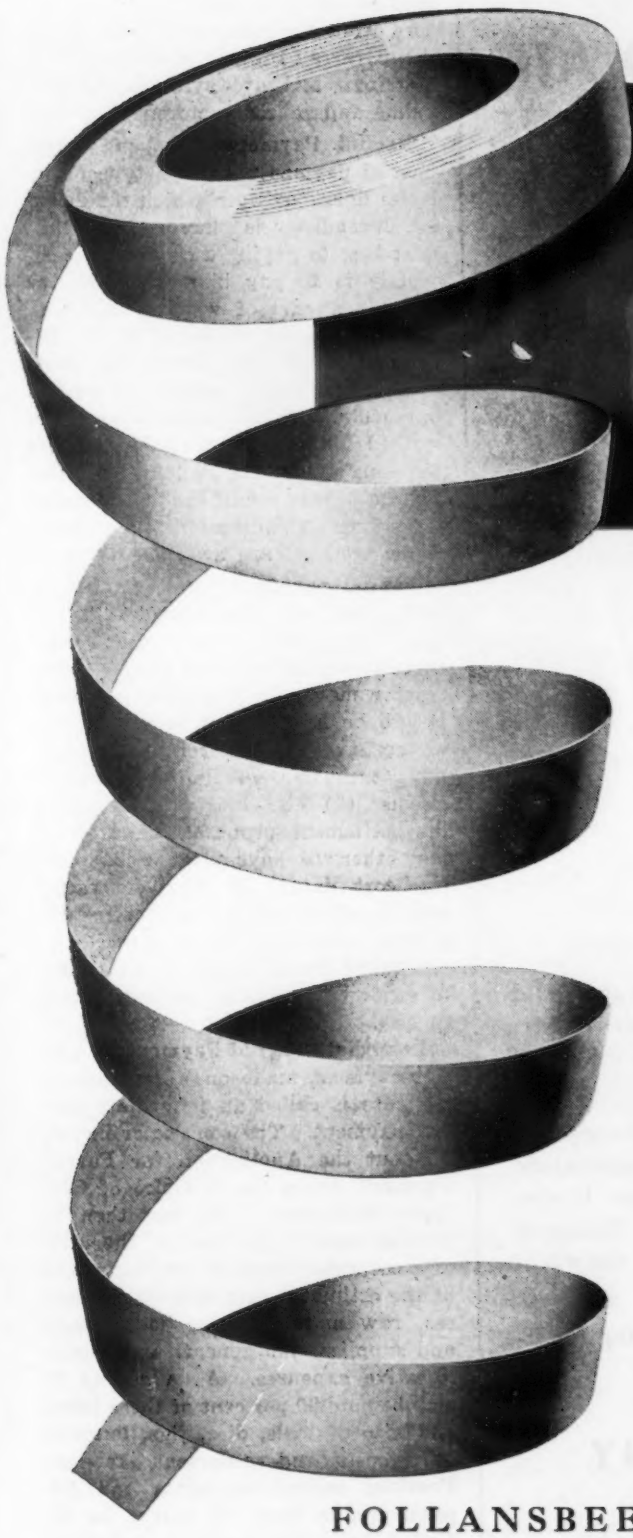
governmental agency. Availing himself of one or more of these types of financing, the contractor can secure funds to help him over the interim from the notice of termination to the date of final settlement.

Advance Payment: Advance payments for war production could be made under a clause in the original contract or by a supplemental agreement. Under the First War Powers Act, the legal limit is 100 per cent of the total contract price. In practice, payments are usually limited to about 30 per cent. These funds are set up in a commercial bank account in the name of the contractor, and withdrawals are authorized by the contracting officer. Advance payments are in the nature of a loan and are made with or without interest. They may be repaid directly or be liquidated by deliveries under the contract. When termination occurs, if the advance payment account has been authorized prior to the notice of termination, any funds still available can be used to provide immediate interim financing. Although the arrangement of an advance-payment account must be made prior to the notice of termination, the amount can be increased after the notice.

When a contract is terminated, the maximum advance payment outstanding cannot be greater than 90 per cent of the total estimated amounts payable in settlement of the contractor's claim. Some contractors might be tempted to overstate their claims, but the Act prescribes a penalty of six per cent of the overstatement. Overstatement, however, might be made in good faith, so provision is made for waiving the penalty when the imposition would be inequitable.

If a contracting officer, in good faith, overpays the contractor, he demands repayment of the excess, and interest is charged on the overpayment at the rate of six per cent per annum from the date the excess arose to the date of repayment. It is possible, for both the penalty for overstatement and the interest for overpayment to apply at the same time.

Advance-payment accounts have marked administrative weaknesses. The account must be arranged prior to the notice of termination and, therefore, might not be available as a means of interim financing. There must be a separate account for each technical service or agency. The funds can be used only against the contract for which the advance was made. Subadvances from the prime to the subcontractor can be made but there



Follansbee cold rolled strip

Precision rolled to your specifications

If you need Cold Rolled Strip Steel in thin gauges, Follansbee merits your consideration as a source for your supplies.

Follansbee brings to the rolling of this staple product its many years of experience as a maker of high quality steels and steel specialties. This means that you can rely on Follansbee to furnish you with Strip that meets your most exacting requirements in Temper, Gauge, Width and Camber.

In addition, Follansbee offers the special attention and services which only the flexibility of a compact organization can provide.

On your next order for Cold Rolled Strip—or other steels—it will pay you to check with Follansbee.

FOLLANSBEE STEEL CORPORATION

GENERAL OFFICES • PITTSBURGH 30, PA.

Sales Offices—New York, Philadelphia, Rochester, Cleveland, Detroit, Milwaukee. *Sales Agents*—Chicago, Indianapolis, St. Louis, Nashville, Los Angeles, San Francisco, Seattle; Toronto and Montreal, Canada. *Plants*—Follansbee, W. Va. and Toronto, O.

ALLOY BLOOMS & BILLETS, SHEETS & STRIP • • • COLD ROLLED CARBON SHEETS & STRIP
POLISHED BLUE SHEETS • ELECTRICAL SHEETS & STRIP • SEAMLESS TERNE ROLL ROOFING

NEW AERO *After Cooler* GIVES DRY COMPRESSED AIR *and* saves cooling water

With "BALANCED WET BULB" TEMPERATURE CONTROL

U. S. Patent Re-issue No. 22,533

● Compressed air experts say that using more thoroughly dried air would save air tool users thousands of dollars in repairs and thousands of hours in lost time. In many industrial processes, drier air will prevent loss of valuable materials or rusting of delicate parts.

The NIAGARA Aero AFTER-COOLER offers a new method—the application of *evaporative* cooling—which makes possible lower air temperature and compressed air that is drier, safer to use for any purpose. It also provides closed circuit jacket water cooling with the Niagara "Balanced Wet Bulb" temperature control, preventing condensation and the washing of lubricating oil into the air lines.

In operation, it saves 95% of cooling water consumption, paying for itself in saving water cost. Write for Bulletin 98.

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air Engineering

DEPT. IA-124, 6 E. 45th St. NEW YORK 17, N. Y.

Field Engineering Offices in Principal Cities

INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

HUMIDIFYING • AIR ENGINEERING EQUIPMENT

are administrative difficulties. In fact, because of these weaknesses, contractors often use guaranteed loans which can cover all the war contracts under one loan and are available to both prime and subcontractors.

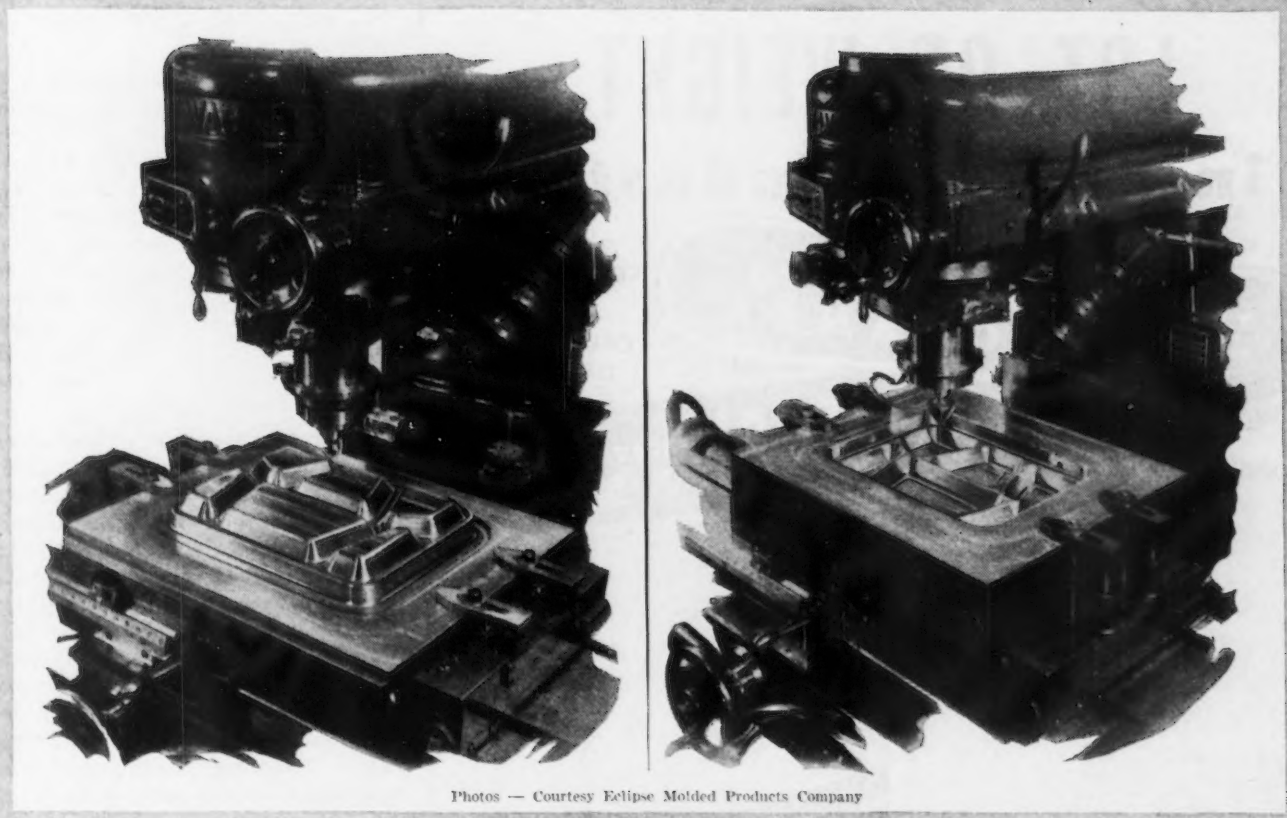
Partial Payments: By and large, partial payments are the type of interim financing upon which the greatest dependency is placed. Obviously, next best to paying a contractor completely is to pay him as quickly as possible a part of what is due him. General Regulation No. 2 of the Office of Contract Settlement lays down the general policy governing partial payments. Three methods are prescribed for making partial payments to prime and subcontractors. To meet certain other conditions encountered in paying subcontractors three additional methods are available.

Partial payments may be made to both prime and subcontractors. The contracting officer is prepared to meet three typical situations: (1) The contractor may want a partial payment before he has had time to ascertain his costs and can therefore only furnish estimates of his termination claims; (2) The contractor may have his settlement proposal prepared or may otherwise have adequate supporting cost data; (3) The contractor may be of doubtful financial responsibility, and the contracting officer, to safeguard the Government, may want to control the partial payment made to him.

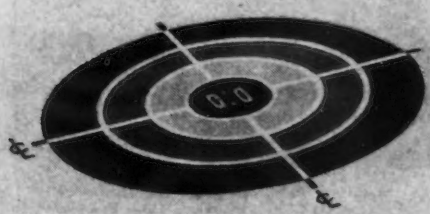
Immediate Partial Payment: A partial payment made on a contractor's estimate is called an immediate partial payment. The contractor merely fills out the Application for Partial Payment, Form No. 4, Office of Contract Settlement. He can then be paid at least 75 per cent of the price of acceptable finished products and of the estimated cost of work in process, raw materials, purchased parts and supplies, and general and administrative expenses. As a ceiling he may be paid 90 per cent of these items and also of tools, dies, jigs, fixtures, other costs, and settlement expenses. Previous partial payments and disposal credits must, of course, be deducted from the amounts indicated. The contractor may receive less than the floor if he requests less than 75 per cent or if the Government's interest requires payment of a smaller amount.

When the contractor has adequate cost data or has prepared a settlement proposal, he may apply for a cost-supported partial payment. He may then be paid a maximum of 100 per

How would you handle this Job in your Shop?



Photos — Courtesy Eclipse Molded Products Company



1001-PC

Molds for plastics pose some tough milling problems occasionally. Here's a tray mold — that could have been difficult, but it was completed on a Milwaukee Rotary Head Milling Machine with typical speed, economy, and accuracy.

Read this job report —

TRAY MOLD

CAVITY SIZE — width, 12 inches, length, 15½ inches, depth, 1½ inches.

Time required for milling both mold halves complete — 219 hours.

All form cutters milled to correct size and shape on the Milwaukee Rotary Head Milling Machine.

Check these advantages of the Milwaukee Rotary Head Milling Machine and how you can benefit from them in your own shop:

DIRECT . . . mills mold cavities in a single set-up without the aid of templets or models.

ACCURATE . . . chances for error are eliminated because there is no change in set-up. Exact control of all combinations of cutting movements—possible only with this machine—transmits mathematical precision to the work.

FAST . . . initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

Write for Bulletin No. 1002C and complete information.

BUILDERS OF MILWAUKEE ROTARY HEAD MILLING MACHINE • MIDGETMILL • SPEEDMILL • FACE MILL GRINDER • AUTOMETRIC JIG BORER • CENTER SCOPE.

Kearney & Trecker

Products

CORPORATION

Milwaukee 14, Wisconsin

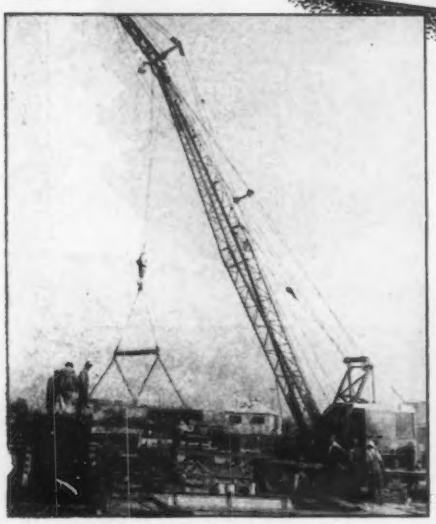
Subsidiary of Kearney & Trecker Corporation

THEY'LL CARRY A LOT OF WEIGHT in Postwar Industry

THE OSGOOD CO. MOBILCRANES — ONE-MAN CONTROLLED

ONE-ENGINE OPERATED

THE GENERAL EXCAVATOR CO. SUPERCRANES — RUBBER-TIRED

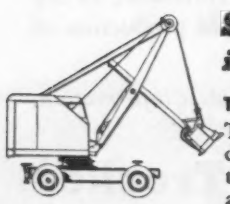


From Richmond Shipyard #2 (above) of Permanente Metals Corp., in California, to the Brooklyn Navy Yard, OSGOOD MOBILCRANES help to speed record-breaking ship production.

By extending the boom of his GENERAL SUPERCRANE to 100 feet, Contractor Henry Selinsky accurately, economically and safely handles a 100 foot stack weighing 5½ tons.

For the countless familiar and new kinds of heavy materials handling jobs which the postwar period will bring for you — in the yard, at the dock, around the plant — the prewar and war-proven power and dependability of Mobilcranes and Supercranes will serve you well. Write now for job analyses.

THE OSGOOD COMPANY
THE GENERAL EXCAVATOR COMPANY
MARION, OHIO



SOMETHING ENTIRELY NEW
in Materials Handling Equipment

The REVOLUTIONARY General TYPE 10

This compact powerhouse—combination crane, shovel and dragline *on rubber*—goes most anywhere, does most anything! One-man, one-engine, on rubber . . . here is your answer to new efficiency and profits.

Watch for preview details on the . . . MACHINE OF TOMORROW

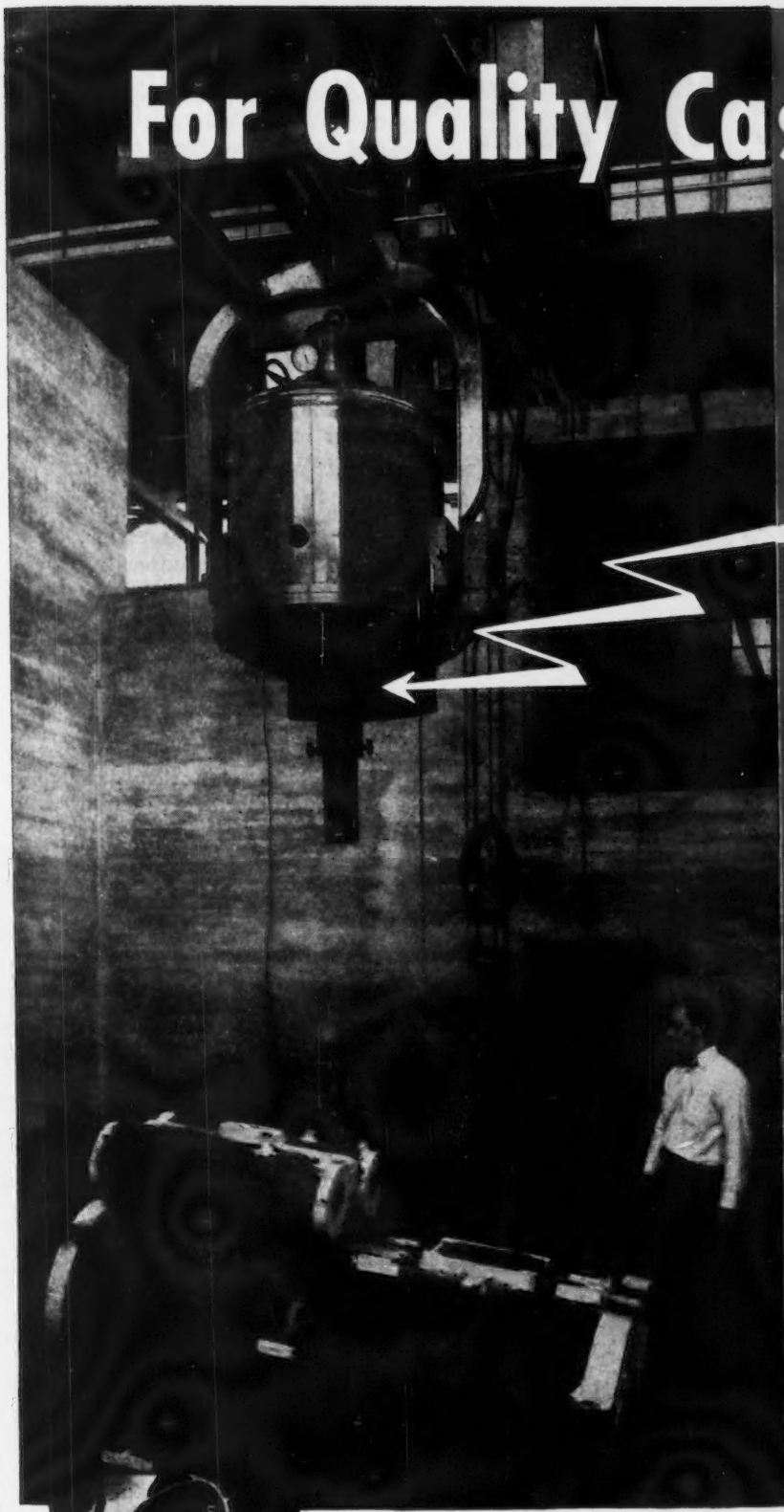
cent of acceptable finished items, 90 per cent of work in process, raw materials, purchased parts and supplies, and a reasonable amount of general and administrative expenses, tools, dies, jigs, fixtures, other costs, and settlement expenses.

There is even an arrangement by which a controlled partial payment can be made to a contractor of doubtful financial responsibility. The controlled partial payment is provided for by a supplemental agreement. An amount is deposited in a bank in the contractor's name in a manner similar to the advance-payment account. As invoices are approved by the contracting officer, he may authorize withdrawals from the account for payment of such vouchers.

Preferred Procedure: These three procedures adequately meet requirements in making partial payments to prime contractors. When making partial payments to subcontractors, the preferred method is to have the subcontractor prepare his application for an immediate or cost-supported partial payment and to pass the application up the chain of subcontractors to the prime contractor, then from the prime contractor to the contracting officer. Preference for this method is based upon certain legal, accounting, and administrative difficulties which may arise when the Government deals directly with the subcontractor. The Government has no direct contractual relationship with subcontractors. Moreover, the prime or an intermediate subcontractor may have counterclaims against a lower-tier subcontractor. In making direct payment down to the lower-tier subcontractors, cognizance may not be taken of such set-offs. As a normal procedure, therefore, the applications for partial payments should be passed up the chain and payments made down through the chain of contractors.

When an application for an immediate or cost-supported partial payment is passed up the chain, the contracting officer may hesitate to make payment to a prime contractor of doubtful financial responsibility. In such a case, a controlled partial payment account can be set up in the name of the prime contractor and withdrawals for the partial payments can be controlled. Payment can then be made down through the chain or directly to the applicant.

Additional Methods of Payment: Three additional methods are provided for paying subcontractors. First, prime or subcontractor may request funds to make partial payments in



For Quality Castings . . .

Here's a *Million Volts* of proof

In a special section of PSF's laboratories, within thick concrete walls, one of the latest GE million-volt X-ray machines furnishes the final proof of the uniform soundness of PSF castings. It's a searching eye from which no defect is hidden, however deeply located. Used both as a special assurance on individual jobs, and as a running check on all production work, this modern "inspector" helps to hold *all* PSF output to consistently high standards. No matter what *your* casting requirements are, PSF's modern facilities can give you visible proof of quality—*in advance!*

W&D 9662

46 YEARS OF STEEL CASTING KNOWLEDGE

Pittsburgh

STEEL FOUNDRY CORPORATION

GLASSPORT, PA.

Sales Offices: NEW YORK • PHILADELPHIA • WASHINGTON AND CHICAGO

PAGE Stainless Steel WIRE

● If there is a way for you to trim production costs by using Shaped Stainless Steel Wire, **PAGE** can help you find the way.

Wire has *always* been the business of **PAGE**. Stainless Steel Wire has been a **PAGE** product since the early days of Stainless. And tremendous demands of war production have given **PAGE** intensive experience in the drawing of Stainless—in a wide variety of shapes.

PAGE Stainless Wire—shaped to your specification—is drawn in sectional areas up to .250" square, in widths to ⅜ inches. If **PAGE** Shaped Wire can be used as a part of your product, the result will probably be lower production costs for you. That's why it may be well worth your while to . . .

Get in touch with Page!

PAGE STEEL AND WIRE DIVISION

Monessen, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Pittsburgh, Portland, San Francisco

In Business for Your Safety

ACCO

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

advance of the requests from his subcontractors. He merely estimates the amount needed and keeps the sum in a separate account. He is thus prepared to make partial payments to subcontractors with maximum rapidity. A second additional method for paying subcontractors is direct payment by the contracting officer to the applicant. The applicant must show clearly that there would be undue delay in passing his application up through the chain, and the contracting officer must be in the process of directly settling the subcontractor's claims. A third additional method for paying subcontractors may also be used. A prime contractor or subcontractor may have authority delegated to him to settle claims to the amount of $10,000. Such authority also includes the right to make partial payments.

Loans: In addition to advance and partial payments, war contractors may obtain interim financing from private financial institutions through either unguaranteed or guaranteed loans. Businessmen normally go to their banks to finance themselves for short-term funds. They are encouraged to seek such unguaranteed loans for war production or for interim financing. The Reconstruction Finance Corporation, the Federal Reserve Bank, and the Smaller War Plants Corporation supplement commercial bank financing in this field. However, when the financial institution feels it necessary, such loans may be guaranteed by the War and Navy Departments or other authorized agency.

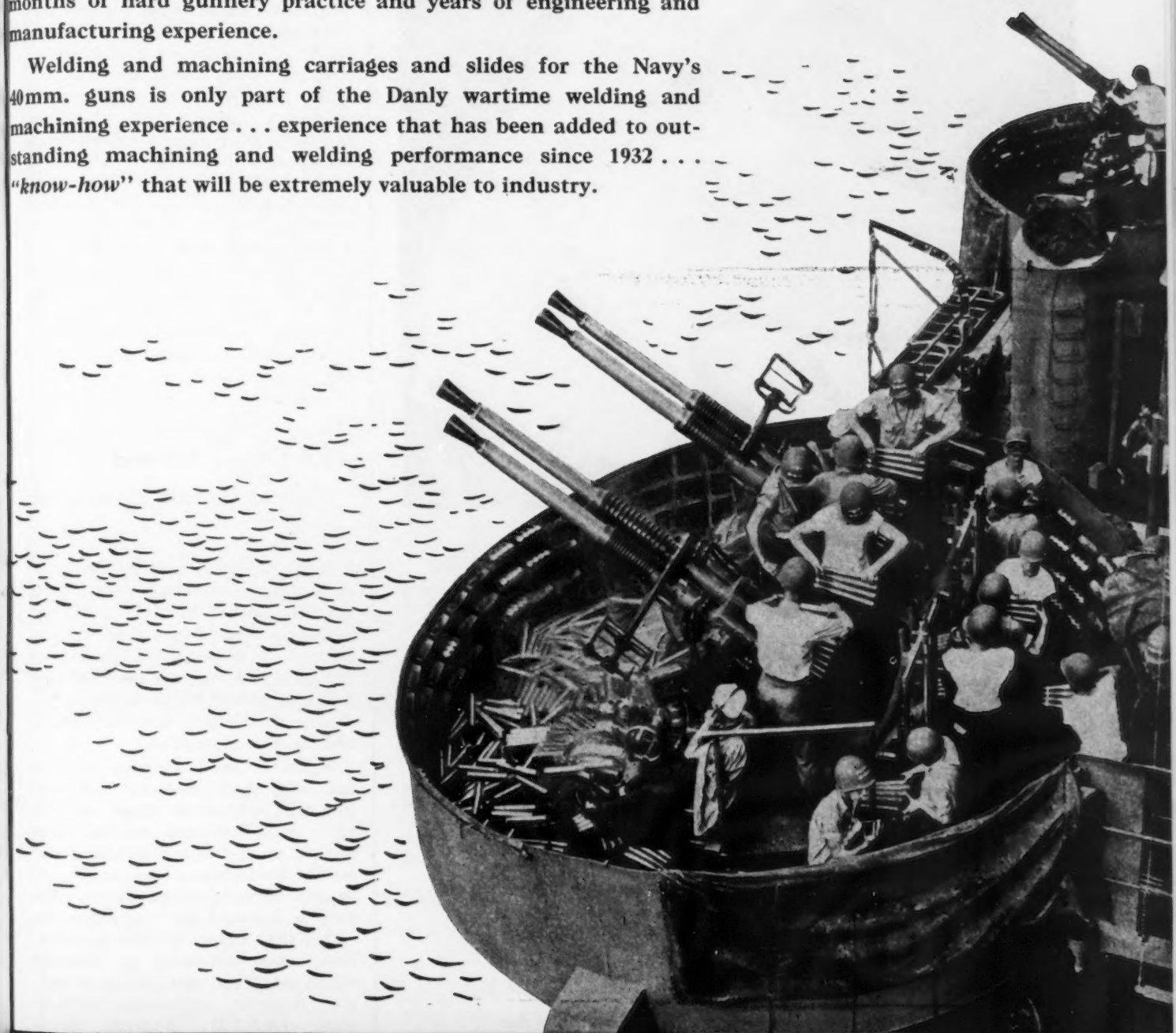
Early in the war effort it became clear that recognized credit policies of financial institutions in many cases would not permit financing required by the greatly expanded war production. Pursuant to the First War Powers Act, the President issued Executive Order 9112 authorizing the War Department, Navy Department, and other agencies to guarantee loans made by financial institutions. The Federal Reserve Bank was appointed fiscal agent to guarantee such loans. The Federal Reserve Bank, pursuant to the delegation of authority, issued Regulation V governing these guaranteed loans.

At present there are only two types of guaranteed loans: the 1944 V-Loans for loans made after September 15, 1944, and Termination Loans. A contractor who primarily needs funds for war production but wants to protect himself against termination will arrange a 1944 V-Loan agreement with clauses allowing him to borrow against

"Know-How" Doesn't Come Overnight

The amazing precision of gun and crew of the Navy's 40mm. Bofors is not a result of a short training period. Behind this precision are months of hard gunnery practice and years of engineering and manufacturing experience.

Welding and machining carriages and slides for the Navy's 40mm. guns is only part of the Danly wartime welding and machining experience . . . experience that has been added to outstanding machining and welding performance since 1932 . . . "*know-how*" that will be extremely valuable to industry.



DANLY MACHINE SPECIALTIES, INC., 2100 South 52nd Ave., Chicago 50, Ill.

DANLYWELD

Danly Die Sets • Die Makers' Supplies • Welded Steel Fabrication

Parish

ALUMINUM STAMPINGS

Unimpaired metal structure and strength. No creases or wrinkles. Fidelity to design. Superior finish. Multiplied production speed. Minimum metal waste. Much lower costs. These are the results of producing even the most intricate modeled shapes on the great Parish battery of regular drawing presses. Parish complete service includes collaboration in the initial design stage; production; heat treating; and X-ray inspections of stampings; assembling including welding; painting or other finishing.

Use Parish facilities in part or their entirety for shapes and parts of aluminum or other metals.

MODERN DESIGN AT LOW COST

Parish Pressed Steel Co.

Subsidiary of SPICER MFG. CORP., READING, PA.

Western Representative: F. Somers Peterson, 57 California St., San Francisco, Calif.

cancelled contracts. If he is primarily interested in financing his terminated contracts, he will arrange a Termination Loan.

With this full arsenal for interim financing, no war contractor need be financially embarrassed by the termination of his war contracts. Whether he is a prime or subcontractor, adequate means are at hand for providing him with funds. Obviously, no payment can be made unless the contractor is prepared to submit either an estimate of his costs or his settlement proposal. He must have such data prepared not only for payments from the Government but also before a loan can be made by a bank. Interim financing depends considerably upon the cooperation of the contractor. But every measure is being taken to help the contractor appreciate his rights and opportunities so that business can be freed for further war production or to meet civilian needs.

AFA Offers Revised Cast Metals Handbook

Chicago

• • • A new edition of the cast metals handbook, extensively revised from the 1940 version has been published by the American Foundrymen's Association. It exhaustively treats, for the designers and purchasers of cast metals, engineering of castings, including considerable data on physical and chemical properties.

Separate and extensive sections deal with steel, malleable iron, cast iron, and non-ferrous alloys, all technical data included having been brought up to date in the light of cast metals developments made since publication of the previous edition. The book is intended for long-range use rather than simply to cover specifications made necessary by wartime shortages of and restrictions on metals. However, conforming specifications (A.S.T.M., Federal, Navy, S.A.E., AMS, and Bureau of Ships) are shown for both ferrous and nonferrous products.

The technical data given were prepared and approved by committees of the AFA. Expensive bibliographies are included for each of the various cast metals sections, with the many references to both American and foreign foundry practices adding to the value for research purposes.

It is available through the American Foundrymen's Association, 222 W. Adams St., Chicago 6, at $6 per copy.

ON A SILENT NIGHT . . .

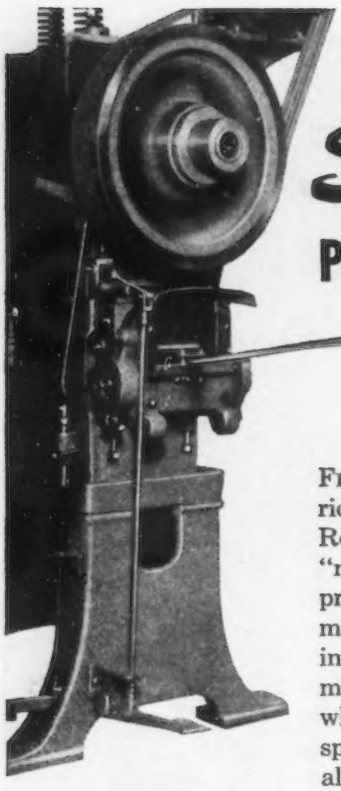
To see the lights coming on again in a war-darkened world holds a special thrill for those whose skill and sweat made what was needed to win the Victory . . . To all of the workers in American industry, we at GATX wish at this holiday season a full measure of the American blessings they have so richly earned.

GENERAL AMERICAN TRANSPORTATION CORPORATION

GATX GENERAL AMERICAN PLATE & WELDING DIVISION PLANT AT SHARON, PA.

Plate & Welding Division — Sharon, Pennsylvania

Specialists in plate fabrication—manufacturers of pressure vessels of steel, alloys and aluminum—all classes of welding—process equipment of all types—chemical engineering laboratories and service—completely equipped field erection department.

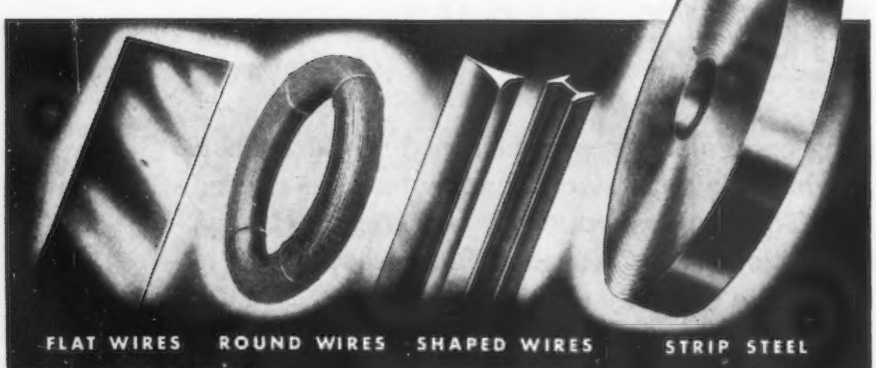


WHERE
Strip Steel
PROVES ITS METAL!

FLASHING THROUGH final fabrication in *your* plant is where Roebling Strip Steel proves its "metal"! Speedy, maximum production, minimum machine maintenance and long die life in shop after shop offer testimony to the skill and care with which Roebling follows your specifications . . . for steel analysis, dimensions and finish.

That's why if you use Strip Steel, Round, Flat or Shaped Wire . . . for forming, punching, drawing or coiling springs . . . you can depend on "Roebling"—and the experience sharpened know-how we've accumulated in over 100 years of *wire specialization!* We have the facilities and the manpower to help you lick your current production problems—and help you get set for tough, post-war, competitive marketing!

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities



FLAT WIRES ROUND WIRES SHAPED WIRES STRIP STEEL

ROEBLING
PACEMAKER IN WIRE PRODUCTS

WIRE ROPE AND STRAND • FITTINGS • SLINGS • SUSPENSION BRIDGES AND CABLES
COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS
AIRCORD, SWAGED TERMINALS AND ASSEMBLIES • AERIAL WIRE ROPE SYSTEMS • ROUND AND SHAPED WIRE • ELECTRICAL WIRES AND CABLES • WIRE CLOTH AND NETTING

Steel Companies Use Model Machines To Teach Safety Rules

New York

• • • **Because they know** how much fathers like to play with electric trains, a number of steel companies have turned to using working models of cranes and steel mill equipment to teach employees the fundamentals of safety, the American Iron & Steel Institute reported.

One steel company has a model crane which is equipped with every type of safety feature, including fire extinguishers, warning signs and safety guards. It is constructed of movable parts and has a real magnet which will pick up weights of approximately 500 lb. and will do almost anything a big crane will do. The model crane is equipped with a limit stop and with regulation controls.

It is used in training classes so that new operators can learn how to handle loads with the fewest number of movements. More important, the operator will learn how to avoid taking chances which might result in injury to the workmen on the floor below. This model has proved effective in many ways in safety training.

Another steel company's model crane is somewhat smaller. It is mounted on a structure four ft. high with the hoist traveling horizontally approximately four ft. Set on casters, it can be moved easily from one department to another.

One safety instructor has worked out a skit and a model stage set which provide a number of laughs for his audience and at the same time give a pointed safety lesson.

Study on Postwar Economy

New York

• • • **Completion of a 32-page** study of the postwar outlook, a dollar-and-cents breakdown of the potential for U. S. peacetime economy, is being issued free to American businessmen by Consolidated Management Consultants.

By gearing themselves to make up immediately for a $65 billion gap when the wartime production program is canceled, and aiming for a national production of $175 billion in 1947, Consolidated Management Consultants asserts, American business can maintain present total war boom production levels undiminished when total peace returns.

LOOK TO FENN WITH CONFIDENCE

for ★ SPECIAL MACHINERY
★ SPECIAL TOOLS
★ SPECIAL PARTS

AS designers and builders of special machinery, special tools, and special parts FENN brings you the accumulated experience of *three generations* continuously engaged in precision machine shop work.

FENN will handle the entire job from blue prints straight through to the finished machine, tool, or part; or take your idea, develop it, and build a machine that will do what you expect of it.

FENN'S long experience on the shop floor and their knowledge gained in solving many difficult mechanical problems give them an individual approach to every problem. For FENN definitely expects to add that something to the finished machine that will pay dividends in faster, smoother, more dependable operation.

IT costs nothing to consult with FENN and no obligation is incurred until you are certain that they can contribute tangible, measurable value to your machinery problems. Your inquiries will have careful and prompt attention.

THE FENN MANUFACTURING COMPANY

Hartford, Connecticut

Builders of Better Machinery To Meet New Demands

The Ruthman engineering staff are continually conducting experiments and research toward new developments and improvements in

GUSHER COOLANT PUMPS

Gusher Pumps Patented and Patents Pending

The new Gusher models are so efficiently adapted to the latest type machines and are so advantageous in operation that many plant engineers are re-designing their machine-tools to include these new-model Gushers. By actual test these newer type Ruthman pumps, like their predecessors in the Gusher line, have *proven* their superiority.

Plant managers and engineers who have an eye to the future *specify* Gusher Coolant Pumps when they want to be assured of an improved coolant system.

Write for new catalog, indexed for ready reference. Remember, there is a Gusher model and type for your special needs.

Model 11020-A

THE RUTHMAN MACHINERY CO.

1821 READING ROAD CINCINNATI 2, OHIO

The "Gusher"—A Modern Pump for Modern Machine Tools

Senate Rejects Project For Canalling Beaver And Mahoning Rivers

Youngstown, Ohio

• • • **Hopes for the canalling** of the Mahoning and Beaver Rivers received another setback this week when the U. S. Senate voted down an amendment to the rivers and harbors bill providing for the project.

Probably the most useful project in the omnibus bill, the Beaver-Mahoning has been rated by the National Rivers and Harbors Congress as the "nation's most meritorious and the 'No. 1 item on its No. 1 list.'" While the project does lack the broad regional appeal of some of the others, it has been difficult for people here to understand why it should have been brought up as an amendment.

Costing over $200,000,000, including the northern end, the Beaver-Mahoning portion would stand the government only $38,500,000, according to the most recent estimate, or slightly more than $1,000,000 a mile. This expenditure would provide for the construction of locks, dredge the channel and shift railroads tracks to Struthers, one of Youngstown's industrial suburbs, and there the steel companies would spend about $4,000,000 more for dock equipment.

Stemming from Youngstown's freight handicap in assembling the raw materials for iron and steel production, in comparison with the costs in competing steel districts, the proposed canal it was said would appreciably lower assembling costs here, which are higher than those of Pittsburgh, the Ohio River Districts, Cleveland, Detroit and Chicago.

Bright Postwar Trade Outlook for Chicago

Chicago

• • • **Postwar foreign trade** prospects for Chicago firms are bright, according to Harry Salinger, foreign trade vice-president of the Chicago Association of Commerce.

"There has been a sharp increase in inquiries received by the association from foreign business concerns seeking information about Chicago products and exporters," Salinger states. "The latest export business opportunities bulletin mailed to exporting members of the association contains digests of inquiries for Chicago-made merchandise from more

TOLHURST CHIP WRINGERS reclaim about 110 gallons of cutting oil every 24 hours from the chips of the Brown and Sharpe screw machines at the Hudson Screw Machine Products Company. Simple and rapid operation enables Hudson to run 10 to 12 loads per hour in each of their 3 Tolhurst Chip Wringers. Tolhurst "Chip Wringers" are capable of recovering as much as 98.6% of cutting oil — by centrifugal force only.

INCREASED CHIP VALUE — Dry chips, ready for remelt, bring higher scrap prices. Machinable pieces of metal, otherwise scrapped, are also retrieved as part of the Tolhurst oil recovering system.

CLEANER PLANT — Frequent collection and cleaning of chips result in neater floors, thereby reducing fire and personal accident hazards.

SAVE CUTTING OIL — SAVE METAL

Write for literature and prices

TOLHURST CHIP WRINGERS

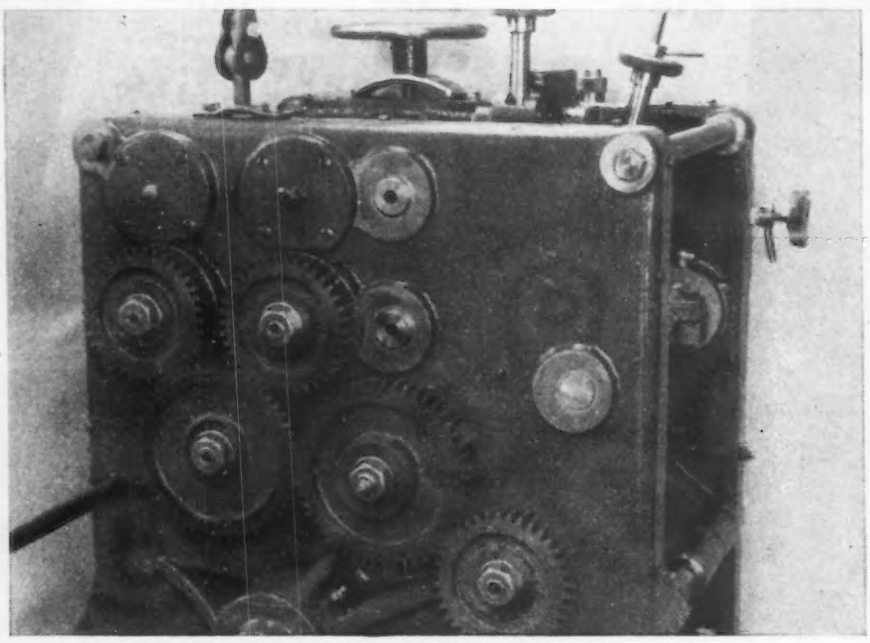
TOLHURST CENTRIFUGAL DIVISION • ***American Machine and Metals, Inc., East Moline, Illinois***

"Since 1852 — CENTRIFUGAL MAKERS FOR THE PROCESS INDUSTRIES"

TORRINGTON
Force Feed Mechanical
LUBRICATOR

Positive, never-failing force-feed bearing lubrication. Design flexibility also enables power takeoff from machine to front, rear, side or bottom by ratchet or rotary means. For complete information write, stating number of feeds and drive desired.

THE TORRINGTON
MANUFACTURING CO., TORRINGTON, CONN.



HELPS TO GREATER ACCURACY *in Spring Coiling*

No. 10 Continuous and "Popcorn" Coiling

All segment type Torrington Spring Coilers may be purchased with the extra facility of continuous coiling. This inexpensive accessory consists of five extra gears and an idler stud.

These gears drive the feed rolls continuously, from the crank shaft. With the segment block brought to dead center of the crank gear, rendering the segment and free-wheeling clutch inoperative, the crank gear drives the cam shaft only, operating it on a 1:1 ratio with the feed rolls. For continuous coiling the only other step is to stop off the cutter action.

The term "popcorn" coiling is a phrase very descriptive of the high production possible on certain short springs, using the continuous coiling gearing. The feed rolls revolve continuously, but a relief ground on their circumference allows the wire to hesitate while the cutter operates.

The maximum feed is the circumference of the feed rolls, minus the amount of relief necessary to allow time for the cutter to operate. Shorter feeds are obtained by increasing the amount of relief.

January 18th—Location and Lubrication of Bearings

THE TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT

than 100 foreign companies located in 35 countries.

"As additional European countries are freed of Nazi occupation, we anticipate a veritable avalanche of inquiries from businessmen in those countries. While many of these queries may not mean much in immediate business, veteran exporters believe that each should be carefully considered. The financial resources of a great number of formerly highly successful foreign businessmen have been seriously drained by the Nazis during the period of occupation. These businessmen still possess the acumen and integrity which made them successful in the past, however, and given the opportunity most of them will come back. The American exporter who is willing to offer them assistance on a sound basis will regain customers whom competitors will have difficulty in taking away when brighter days return."

General Motors Hints Interest in Postwar Aviation Manufacture

Detroit

• • • **Announcement of the centralizing of aircraft development activity at the Allison division of General Motors has been accompanied by a subtle hint that General Motors Corp. will be directly interested in postwar aircraft manufacture.**

The announcement by C. E. Wilson, president of GM, said that development and test work on Allison engines "for the moment will be confined to military requirements, but when possibl-, work will be commenced on applications of Allison engines to commercial aircraft."

The announcement further stated that facilities, including a large hangar and work shops now being completed at Indianapolis, have "been provided in order that Allison might more effectively carry out engine installation work and more thoroughly coordinate engine and plane structures and performance."

The Aircraft Development Section is being transferred completely to the Allison Division, but will remain under Don Berlin, who headed it since it was established first under the corporation at large, then under Fisher Body.

"This transfer is being effected at this time," said Wilson, "in order to consolidate the activities of the corporation."

Sulphite-Treated
Alloy and Special Steels

BENEFITS TO USERS

- ✓ 25% Greater Machining Speed
- ✓ 200% Longer Tool Life
- ✓ Fewer Rejections
- ✓ More Uniform Physical Properties
- ✓ Fewer Operations
- ✓ Better Finished Product

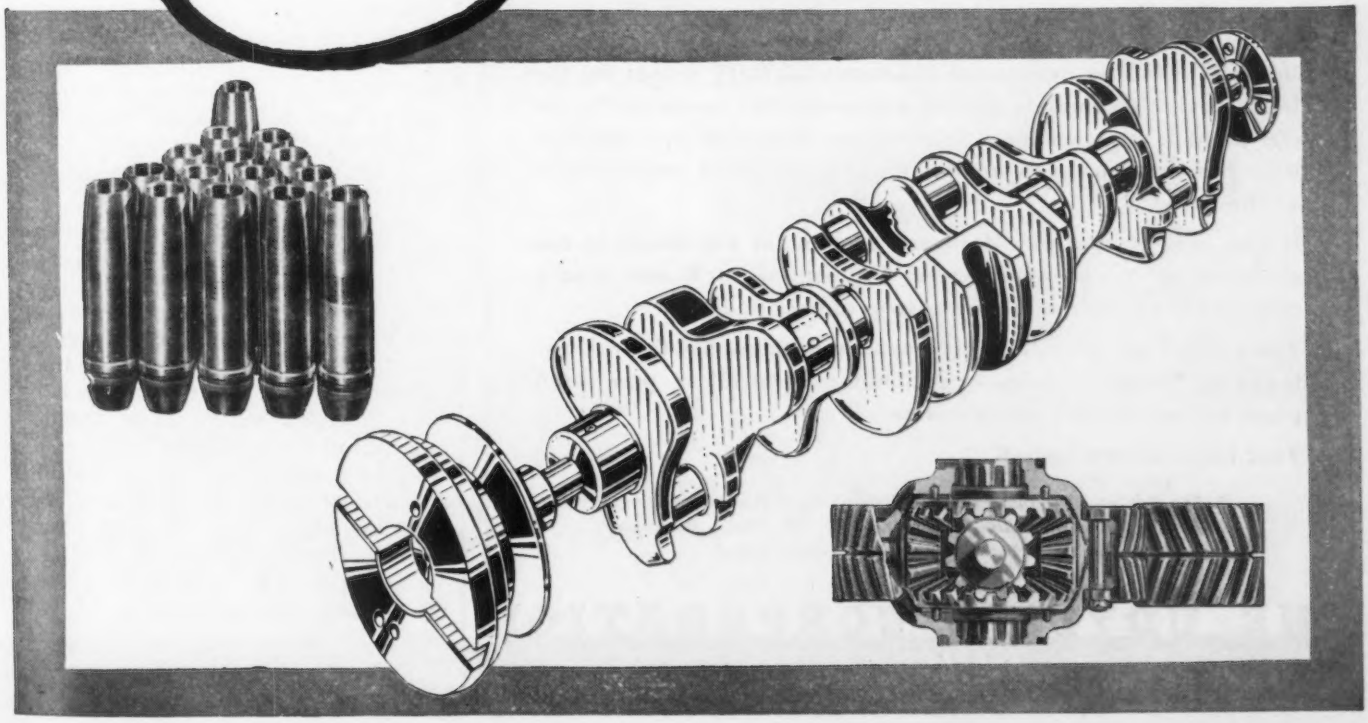
SULPHITE-TREATED alloy and special steels, which we have produced for a number of years, have solved many problems for steel users. They have been most satisfactorily applied where machinability is of first importance.

Sulphite treatment can be applied to most types of steel. It has been used successfully in the production of shells, crankshafts, camshafts, axles, and gears.

If you believe that your company may have an application for sulphite-treated steels, our sales and metallurgical staffs are at your service. We have accomplished satisfactory results for others and are ready to serve you in the same way.

WISCONSIN STEEL COMPANY

Affiliate of International Harvester Company
General Offices: 180 North Michigan Avenue, Chicago 1, Illinois



Specify UDYLITE Equipment for Bulk Finishing of Small Parts

In metal finishing equipment the name UDYLITE stands for the best. Udylite's complete line of equipment for the metal finishing plant is practical and dependable—designed by engineers who are thoroughly aware of the problems and requirements of the trade.

If you require specially designed equipment not found in our standard lines our experienced engineering staff will gladly help you work out the proper answer to your needs.

The respect for UDYLITE equipment is nationwide—the advantages of Udylite's unique "continuing service" in your own plant are worth your consideration.

Your inquiries are invited.

A. The Udylite Handiplater. B. Multiple Cylinder Horizontal Barrel. C. Udylite Automatic Barrel Plating Machine. D. Udylite Horizontal Barrel with Hoist. E. The Udylite Multi Purpose Barrel.

THE UDYLITE CORPORATION

1651 EAST GRAND BOULEVARD • DETROIT 11, MICHIGAN
REPRESENTATIVES IN ALL PRINCIPAL CITIES

GM Dealers to Get New Building Plans Out of Competition

Detroit

• • • **An architectural competition** for the design of automobile dealers' places of business in which $55,000 in prizes will be awarded by General Motors was announced recently by Albert Bradley, executive vice president of the corporation.

The competition was decided on by General Motors after many dealers had indicated their postwar plans included enlarging their present buildings or building new places of business. The types of queries which dealers have been sending the car divisions indicate a need for more efficient places of business and evolve around the major functions of an automobile dealer, including sale and display of new cars, trucks and used cars, and operations of service and parts departments.

Problems of automobile dealers in finding suitable buildings for their needs have become increasingly difficult. The purpose of the competition is to acquaint architects and builders with the dealers' problems in order that future building plans will take into account the complexities of an automobile dealer's business.

The competition is under the direction of M. E. St. Aubin, director of the General Motors Service Section. It will be conducted by the Architectural Forum and governed by competition rules of the American Institute of Architects.

The competition will run from Jan. 1 to midnight of April 16, 1945. Rules and regulations governing the competition may be obtained from the Architectural Forum.

A total of 60 prizes is being offered in the following classifications:

Plans for average-size passenger and commercial (automobile and truck) dealerships, medium-size passenger and commercial dealerships, exclusively passenger and exclusively commercial dealerships. The fifth group of major awards and honorable mentions will be given for design detail for structural and decorative adaptations. It will be possible for contestants to win major prizes for design detail in addition to whatever awards they may receive in the competition for dealership plans. Entrants in the competition are to register with the Architectural Forum, 350 Fifth Avenue, New York 1, N. Y.

SO SORRY—HUNDREDS MORE COMING, "HONORABLE" JAPANESE

SOON—and perhaps sooner than you think—*great fleets* of Boeing Superfortresses will be roaring over Japan, blasting those islands with a ferocity unparalleled in the history of war. That's how America will remember Pearl Harbor, "honorable" Japanese.

At Boeing, creator and principal producer of the Superfortress, and at two other concerns, the giant planes are rolling off assembly lines in ever-increasing numbers. And to feed the needs of these builders, a vast army of men and women at countless other plants is producing sub-assemblies and parts on round-the-clock schedules.

Everywhere speed is the keynote of this great mass production program for one of our greatest weapons of war. And because speed and quality in painting and coating operations mean DeVilbiss Spray Equipment, you'll find this equipment on the firing line at Boeing, at Hudson Motor Car and at other plants working on the Superfortress.

Whatever *you* make—now or after return to peacetime production—it can be painted or coated faster and better with the right combination of DeVilbiss spray products. To see that you get that right combination, a DeVilbiss spray engineer will make a thorough study of your job in your plant. Get his recommendations before you decide!

Above: Spraying insignia on Superfortress with DeVilbiss Equipment, Boeing, Wichita.

Right: Tail gunner's cabin being spray painted the quick DeVilbiss way at Hudson Motor Car.

THE DEVILBISS COMPANY, TOLEDO 1, OHIO
Canadian Plant: Windsor, Ontario

DE VILBISS
Spray Systems

SPRAY EQUIPMENT • EXHAUST SYSTEMS • AIR COMPRESSORS • HOSE & CONNECTIONS

how to buy... a cutting fluid

• "It's hard to tell the depth of a well by the length of the handle on the pump"... and it's even harder to tell the real worth of a cutting fluid by appearances alone.

For instance:

Lower viscosity does not necessarily mean more effectiveness at the work area.

Dark oils are often cleaner than light-colored, clear-looking oils.

More total sulphur does not always mean better cutting quality.

Straight oils are often better refrigerants at the point of contact than soluble products.

Long dilutions often outperform oils used straight.

The wise buyer measures cutting fluids by how they perform on the machine. To find the best performing oil for his needs, he looks to experience.

D. A. Stuart Oil Co., specialists in industrial oils since 1865, share their experience with thousands of such wise buyers. They stand ready to do the same for you.

WRITE FOR YOUR COPY

of the *New* Stuart 60 page handbook: "Cutting Fluids For Better Machining." It is full of data—information that you will find a helpful guide to the most efficient use of cutting fluids. It is free to executives and engineers.

D.A. Stuart Oil CO.

LIMITED

2737 SOUTH TROY STREET, CHICAGO 23, ILL.

ESTABLISHED 1865

Warehouses in Principal Metal-Working Centers

Packard to Build Engine Test Plant On Army Air Field

Detroit

• • • **Ground has just** been broken and building contracts placed for aircraft engine flight testing facilities to be operated by Packard Motor Car Company at Willow Run Army Air Base, according to a statement made by Geo. T. Christopher, president and general manager of this engine plant.

New buildings will include a hangar large enough to house the biggest bomber and several fighter planes, a three-story engineering laboratory topped by a flight observation tower, and an attached power plant.

The Packard head revealed the project as being undertaken at the specific request of the AAF. It is definitely linked to Packard's aircraft engine developmental program launched last summer at the company's Toledo, O., division.

The latter will develop and test advanced aircraft engines which, he said, will be installed in planes and flight tested at Willow Run.

"Until the new structures are completed, the experimental work which is starting immediately, will have temporary housing at Willow Run made available by the cooperation of the Army and the Ford Motor Company," Christopher stated.

Christopher said that an additional $100,000 for the broadened purpose is now being consummated with the Defense Plant Corporation. Together with other grants, it will bring the total for Packard's engine developmental work and flight testing close to $4,000,000.

"Establishment of the engineering facilities at the Willow Run airport now gives Packard the ability to coordinate two phases of its advanced aircraft engine developmental program," Christopher reported.

"Our special aircraft engine division at the Toledo plant will be responsible for development of advanced engines for the Army, and the Willow Run laboratories will engineer modern installations of those engines in air frames and flight test them on the spot."

Willow Run equipment, he amplified, will include engineering and modification shops for installation of engine mounts and auxiliary engine equipment such as coolant and fuel systems, and complete flight research facilities.

TO HOOVER FOR . . .
QUALITY *and* QUANTITY WAR PRODUCTION

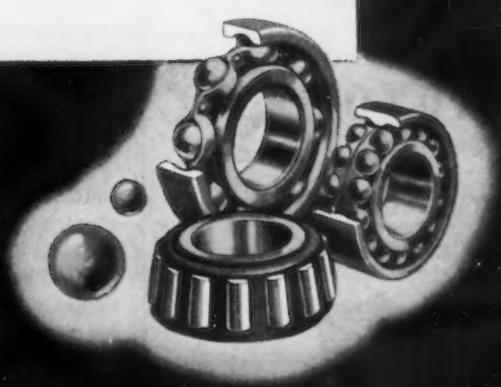
Not Millions — but Billions — not one or two or three — but actually more than THREE BILLION Hoover Products have been supplied for War Equipment.

For use in more than two thousand different types of War Apparatus — from tiny delicate super-precision instruments, to giant Ships — Guns — Tanks — Planes — Machine Tools and Trucks — the really tough jobs where precision and brute strength are essentials.

Hats off to the Hoover Men and Women who have produced more than THREE BILLION

Hoover Ball Bearings
Hoover Balls
Hoover Tapered Roller Bearings

the combination which has earned the Army-Navy "E" Award.



HOOVER
BALL AND BEARING COMPANY
ANN ARBOR, MICHIGAN

PORTRAIT OF AN

who says that even the newcomers can mate units more quickly when they assemble

SCREW MACHINE PRODUCTS

made FASTER and BETTER for LESS

by

U•S•AUTOMATIC

CORPORATION

Screw Machine Products

AMHERST • OHIO

Chicago Detroit New York

Research on Steel Encouraged by War Has Peacetime Uses

• • • **Much of the** research now under way in steel company laboratories is aimed primarily at improving military equipment, but many of the projects are also expected to be of benefit in peacetime, the American Iron and Steel Institute reported recently.

Examination of research projects at a number of different steel companies shows that most of the studies pertain to the improvement of alloy steels for the aircraft industry. However, much research along other lines is known to be under way through the steel industry.

Among the projects now under study are investigations into the effects of temperatures upon the properties of metal. The war has subjected steel and other metals to more severe temperature tests than ever before. Obviously, enlarged knowledge about the effects of temperatures will be helpful in peacetime.

Three companies have initiated programs of research on the related subjects of alloys, suitable for applications where high temperatures are a factor, such as are encountered in airplane superchargers and gas turbines.

A study of the heat treatment and ballistic resistance of steels for light weight armor plate might appear at first glance to be strictly a war-time project, yet the findings may be valuable in improving steel for coal chutes and other purposes.

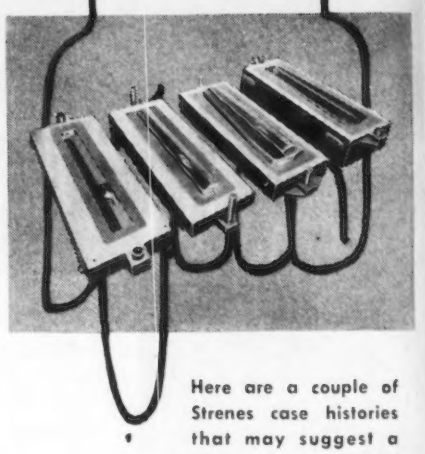
Seeking improved steels for guns, several laboratories are cooperating in the study of improved compositions and heat treatments. The results should be applicable to other types of severe service, in postwar automotive engines for example.

Another study that holds promise of peacetime benefits is devoted to the development of special stainless steel articles, such as springs, where an exceptionally high proportional limit and tensile strength are desired.

A number of research projects are centered upon welding. Fundamental studies on the heat treating characteristics and metallography of boron-treated steels are also being made. A recently developed black oxide coating for stainless steel, which has already been introduced to steel users, is being further pursued from the research standpoint.

Other projects include: Electro-

STRENES METAL POINTS THE WAY



Here are a couple of Strenes case histories that may suggest a way to reconvert to civilian production a little faster.

Tractor Top-Dies

Strenes Metal—cast-to-shape—was specified for stamping tractor hood tops. An accurate cost check showed a saving of around 50% in machining time due to the cast-to-shape construction. On reconversion tooling rush, such a saving will be highly advantageous.

Hydrator Pan Die

Dies of Strenes Metal stand up, too. One refrigerator hydrator pan die, for instance, stamped 2,000,000 parts with a 3½" draw out of .50 material. And, due to the self-lubricating property of the metal, stoning and polishing operations were virtually unnecessary.

Both for civilian and war products, Strenes Metal has been a definite help on many tooling programs. Facts and figures on request. Write today.

Strenes Metal for drawing and forming dies.

The Advance Foundry Co.
100 Seminary Ave.,
DAYTON 3, OHIO

Strenes METAL

it's impossible!

time was when it was considered impossible to spot weld heavy gauges with a *balanced three-phase load* . . .

"THREE-PHASE" WELDING

now provides the answer!

Both manufacturers and power companies have long torn their hair over the problem of spot welding heavy gauges. Conventional AC single phase welders cause serious disturbance to the usual three-phase power supply, operate at low power factor because of the heavy reactive load, and demand high power due to the high secondary resistance.

In announcing the "THREE-PHASE", Sciaky presents a method of resistance welding heavy gauges which effectively solves these problems. By employing an ingenious system of rectification and reconversion, Sciaky welders now ***operate on a balanced Three Phase load at near unity power factor (use less KVA).***

Watch for subsequent announcements explaining the operation of the "THREE-PHASE."

SCIAKY BROS.

Manufacturers of a Complete Line of AC and DC Electric Resistance Welding Machines

4915 West 67th Street Chicago 38, Illinois

Offices in Detroit, Los Angeles, Washington and Cleveland
Representatives in Principal Cities
In England: Sciaky Electric Welding Machines, Ltd., London
In France: Sciaky S.A., 13, 15 Rue Charles Fournier, Paris

polishing processes for stainless steel; the commercial development of stainless steels possessing precipitation hardening properties; the mechanical properties and metallurgical characteristics of low alloy constructional steels; research on heat treated stainless steel for aircraft structural members, research on alloy steel for certain highly stressed aircraft parts, and study of the effects upon steel of extreme cold, such as might be found at high altitudes or in the Arctics.

Shankless Twist Drills Introduced

(CONCLUDED FROM PAGE 59)

so that it will "give" slightly under severe torsional strain, thus reducing drill breakage. Furthermore, the grain of the steel is preserved by the twisting action, as contrasted with conventional drills where the flute milling cuts across the grain of the steel.

Other advantages cited for the shankless drill are that the usable portion of the flutes of shankless drills is 25 to 40 per cent greater than Republic's conventional high speed taper shank drills (see Fig. 3); also that the scrap recovery value of the unused portion of the shankless drill is considerably higher since it is all high speed steel.

There are two principal disadvantages of the shankless drill: It is necessary to maintain a supply of drill drivers and because of the heavy web construction, it is necessary to thin the web of the drill at the point each time it is resharpened. It is pointed out, however, that many large users of drills have in the past effected substantial savings in their drill costs by converting regular straight shank jobbers or automotive series drills into taper shank drills by using conventional drill drivers. The Ford Motor Co. feels that these disadvantages are outweighed by the money saving advantages and superior performance of this new type drill.

The basic patents on roll-forged and twisted drills, as well as drill drivers, expired many years ago so that other drill manufacturers will be able to make shankless type drills and drill drivers without risk of patent infringement. Scully-Jones & Co. of Chicago and J. C. Glenzer Co. of Detroit have announced that they will manufacture and sell a complete line of drill drivers for Republic's new shankless drills.

That the first drill manufacturer to put these new drills on the market happens to be Republic Drill & Tool Co. is explained by the fact that Republic's chief engineer, Harry W. Delaney, is a Ford man. Prior to joining Republic in 1940, Delaney had spent 25 years with Ford Motor Co. and was in charge of Ford's River Rouge drill department at the time Raymond Rausch's shankless type drill was perfected.

Along with the new shankless drill, Republic has presented for the first time its new "All-Flute" high speed straight shank drill. This drill is produced by the same roll-forging and hot-twisting processes as are used in making the shankless drill and is offered in sizes ¼ to ½ in. diameter. These drills can be used in all standard drill chucks, without the use of special holders of any kind. The straight shank end of the all-flute drill is produced by giving that end of the fluted section an extra twist which causes the spiral flutes to be compressed so that the shank can be gripped firmly in any standard drill chuck (see Fig. 4).

Standards Group Elects

New York

• • • **The re-election of** Henry B. Bryans, executive vice-president and director of the Philadelphia Electric Co. was announced recently at the annual meeting of the American Standards Association at the Hotel Roosevelt, New York. Mr. Bryans has already served one term as president and has been a member of the board of directors since 1941.

Other officers of the American Standards Association for the coming year will be: Vice-president, George S. Case, chairman of the board, Lamson & Sessions Co. (re-elected); Chairman, Standards Council, H. S. Osborne, American Telephone & Telegraph Co. (re-elected).

ERIE BUCKETS

General Purpose
Dredging and Hard Digging
Dragline
Material Handlers
Hook-on Type
Ore Handling
Coal and Coke
4-Rope
Barge Type
Strayer Electric

THE COMPLETE LINE

Write for Data

Above types built in weights and capacities to suit your crane and job requirements.

ERIE STEEL CONSTRUCTION CO.
ERIE, PENNSYLVANIA
Aggre Meters • Buckets • Concrete Plants • Traveling Cranes

Production Quotas On Farm Machinery For Canada Were Lifted

Washington

• • • **WPB has removed** production quotas on farm machinery attachments manufactured for export to Canada. These quotas were formerly set at 100 per cent, by weight, of base production (at half the net weight shipped by a manufacturer in 1940 and 1941 combined). WPB's action, taken by an amendment to L-257-a (Farm Machinery Exports) places production of attachments for Canada on an equal footing with that for domestic sale, on which there is no quota. Overall production of attachments for Canadian export without quota restrictions will probably fall below the 100 per cent quota, WPB Farm Machinery Division officials estimate.

The amended order also removes the former provision requiring each producer to file monthly reports of his export shipments.

OPA Advisory Group Named for Can Makers

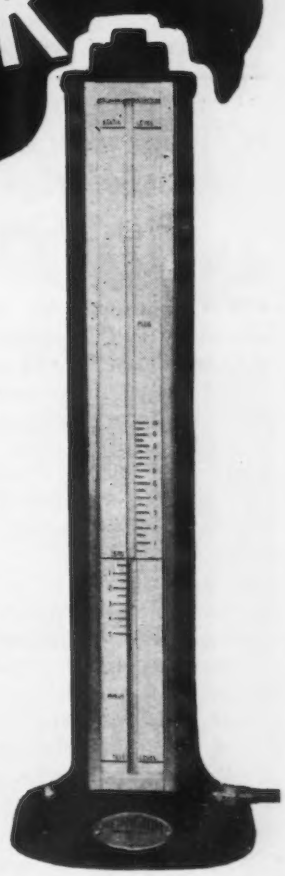
Washington

• • • **Nine manufacturers** of tin cans have been appointed to an industry advisory committee which will advise and consult with OPA on problems which may arise in the pricing of their products. This new committee will represent approximately 65 tin can manufacturers located in all parts of the country. At the present time these cans are priced under GMPR and Maximum Price Regulation No. 350—Packers' Tin Cans.

Members of the Can Manufacturers' Industry Advisory Committee are:

Walter Compertz, vice president, Mason Can Co., East Providence, R. I.; C. A. Rolfes, sales manager, The Heakin Can Co., Cincinnati, Ohio; S. L. Buschman, president, National Can Corp., New York; J. F. Egenolf, vice president in charge of manufacturing, Continental Can Co., New York; E. F. Euphrat, president, Pacific Can Co., San Francisco; H. K. Taylor, Jr., treasurer, George D. Ellis & Sons, Inc., Philadelphia; E. B. Webster, executive vice president, Crown Can Co., Philadelphia; W. C. Stolk, vice president, American Can Co., New York; and J. R. Phelps, president, Phelps Can Co., Weirton, W. Va.

The METRICATOR



For

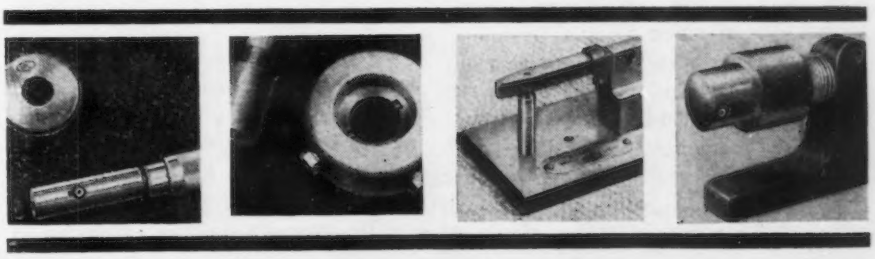
PRECISION MEASUREMENTS

of

INTERNAL DIAMETERS
EXTERNAL DIAMETERS
TAPER AND STRAIGHTNESS
SLOTS AND THICKNESS
CONCENTRICITY AND ALIGNMENT

All METRICATOR gages are custom-built—engineered to meet your specific needs, assuring you of greater adaptability and guaranteeing precision accuracy.

METRICATOR gages eliminate human element variations and maintain their high degree of accuracy for a longer period of time in spite of wear.



SEE THE METRICATOR IN OPERATION IN YOUR OWN PLANT . . . SOLVING YOUR TOUGHEST GAGING PROBLEM.

Write Today for Illustrated Literature

Metrical Laboratories, Inc.
ANN ARBOR, MICHIGAN

MACHINE TOOLS

. . . News and Market Activities

WPB Sponsors and DPC Finances Huge Forging Press at Mesta Plant

Washington

• • • **Sponsored by WPB** and financed by DPC at an estimated cost of $3,500,000, the board has announced that an 18,000-ton hydraulic forging press, the largest ever to be installed in this country, is being built by the Mesta Machine Co., Pittsburgh. While intended primarily for the forging of magnesium it may also be used on aluminum or other metals. A subsidiary of the Wyman-Gordon Co., Worcester, Mass., which has had 65 years of forging experience, will build and operate the plant for DPC and production is expected to begin within a year. It is estimated that the press will weigh about 5,000,000 lb. and will exert a pressure up to 36,000,000 lb. At capacity, the plant will employ between 200 and 300 workers.

WPB said that the new press will contribute to the development of larger and more efficient aircraft components and other military equipment where larger forgings are required. No die forging press over 10,000-ton capacity, WPB Aluminum and Magnesium Division officials said, has been available for production of light-metal forgings in this country.

Magnesium forgings up to 5 ft. or 6 ft. long, it was stated, are known to have been made by the Germans and to have been used as engine mounts in certain of their aircraft, but the new 18,000-ton press will enable the production of still larger sizes.

Surveys conducted by the armed services and WPB indicate that aircraft designers as well as designers of other military equipment would use larger forgings advantageously in their equipment if they were available. Other countries have had die-forging presses for light metals of more than 10,000-ton capacity for a number of years.

Aluminum and magnesium officials emphasized that as larger aircraft become necessary, especially for the Pacific operations, it is important that designers of such aircraft should be enabled to go beyond the limitations imposed by the size of existing forging equipment.

An important feature of the new forging project is that production or research work on the press will be available to any company or agency having a large forging problem. Cooperative development work on it, including development of new forging alloys, will be energetically encouraged, WPB said.

•

M. S. Jones Assigned To Machinery Prices

Washington

• • • **Malcolm S. Jones**, Brookline, Mass., a graduate mechanical engineer, with over 30 years' experience in the machine tool and petroleum fields, a member of the OPA Office of Industry Advisory Committee, has been assigned to the machinery price branch together with other price branches of that government agency. Besides representing the administrator at meetings, members of the staff of the Office of Industry Advisory Committees handle the mechanics of supervising and coordinating the committee program, as well as processing of official committee documents and recommendations.

•

November Bookings Move Up

Cincinnati

• • • **New business in** this area has been good in November with some interests reporting November bookings to be the largest of the year. As a result, backlogs have become more extended with the market averaging a trifle over six months extension in some quarters. Orders have been refused because of the inability to make deliveries in less than six months. Manpower is continuing to restrict the market both in final production as well as in the ability to obtain materials. The tightest bottleneck appears in castings where foundry plants are being curtailed in output because of lack of manpower. In the tool industry itself the same trouble continues to bedevil management with some interests indicating the loss employees greater than the replacements.

Lending of Workers Urged to Speed Up Machine Tool Output

Washington

• • • **As a means of the** early production of approximately 6000 machine tools which they said are urgently needed to meet the expanded mortar and heavy artillery program, WPB officials at a meeting recently of the Machine Tools Labor Advisory Committee suggested that shops producing tools not in such great need lend some of their skilled men to builders who are making the critically required tools. It was also reported at the meeting that the Army is considering the release of some men to the machine tool shops. WPB Tools Division Director John S. Chafee said that the "urgency for machine tools to meet the military program is far greater than any problem which WPB has faced in recent months."

The Labor Advisory Committee made the following recommendations:

1—That all plants producing heavy ammunition equipment be given top urgency manpower ratings.

2—That an immediate analysis be made of former manufacturers and subcontractors of machine tools and components in order to expand the capacity of the industry. This should include the fullest utilization of smaller war plants in each area.

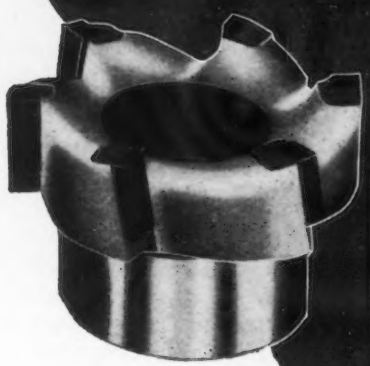
3—That meetings sponsored by top government officials and representatives of labor and management be held in the regions affected, to encourage complete cooperation to meet these schedules.

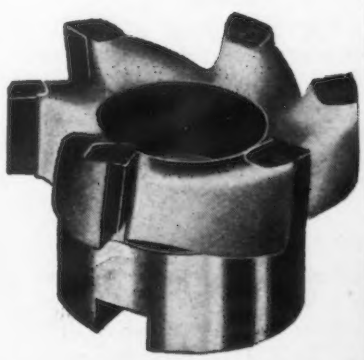
4—That no new machine tools be built until all available machine tools are screened to insure full utilization of all tools freed as a result of cutbacks, contract terminations and lowered 1945 requirements for other items.

5—That any new orders for machine tools be placed immediately.

6—That the Labor Advisory Committee be informed of the placing of orders plant by plant, in order that labor may most effectively cooperate in the program.

LOOK! NEW LOW PRICES ON SUPER SHELL END AND FACE MILLS!





It's true! Down go prices on SUPER Shell End and Face Mills! Ever increasing orders from users, improved manufacturing techniques, increased production facilities, engineering research and development . . . these are reasons why the new low prices shown below are possible.

If you have been using SUPER Shell End and Face Mills you know of the production economies resulting from the faster cutting and the cleaner cutting that these tools produce. You know, too, of the finer finishes, the greater accuracy and the longer tool life with these cutters on the job.

Now add to these economies the savings you get from these new low prices and you'll agree . . . SUPER Milling Cutters are *real* MONEY SAVERS!

PRICE LIST

SIZE	FOR GENERAL USE		FOR STEEL		NEW PRICE EACH
	No. of Teeth	Stock Number	No. of Teeth	Stock Number	
SHELL END MILLS					
1¼"	4	GSM-1	6	SSM-1	$17.00
1½"	4	GSM-2	6	SSM-2	18.00
1¾"	4	GSM-3	6	SSM-3	19.00
2"	4	GSM-4	6	SSM-4	19.50
2¼"	6	GSM-5	6	SSM-5	20.00
2½"	6	GSM-6	6	SSM-6	20.50
2¾"	6	GSM-7	6	SSM-7	21.50
3"	6	GSM-8	6	SSM-8	22.50
3½"	6	GSM-9	6	SSM-9	25.00
4"	6	GSM-10	6	SSM-10	27.50
4½"	6	GSM-11	6	SSM-11	32.00
5"	6	GSM-12	8	SSM-12	35.00
5½"	6	GSM-13	8	SSM-13	37.00
6"	6	GSM-14	8	SSM-14	40.00
FACE MILLS					
8"	8	GFAC-8	10	SFAC-8	60.00
10"	8	GFAC-10	12	SFAC-10	75.00

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 4105 San Fernando Rd., Glendale 4, Cal.

NON-FERROUS METALS

. . . News and Market Activities

Stanley Sees Postwar Increase In Market for Alloys of Nickel

Copper Cliff, Ont.

• • • **The amount of** nickel supplied to the United Nations so far this year has been high but the total for the year will not equal 1943, according to the year-end statement of Robert C. Stanley, president of the International Nickel Co. of Canada, Ltd. The shortage of labor at the mines and lowered efficiency resulting from the necessity of training inexperienced workers have prevented full use of the increased plant capacity which has been provided for essential war needs in the past few years. Nevertheless, Canada was able to deliver 50 per cent more nickel than in prewar years.

It is anticipated by Mr. Stanley that nickel will come out of the present conflict with a more favorable outlook than at the close of World War I. In 1944 the steel industry continued to be the largest consumer of nickel, requiring two-thirds of nickel production for the stainless and engineering alloy steels. The next largest consuming industries were those producing copper alloys and the nickel chromium alloys for electrical and heat resistance. The postwar era should see an even greater utilization of stainless steels, since their mechanical properties and corrosion resistance fit them for many industrial applications. Wide acceptance of the NE steels has made nickel more broadly useful to the war effort as it was possible to apply the metal to a substantially larger steel tonnage; but greater use of the nickel-chromium-molybdenum alloy steels, including some of the NE types, is expected in the postwar era.

Brass rolling mills' consumption of nickel in 1944 consisted principally of cupro-nickel products for marine construction, with small amounts also being employed in brass and bronze compositions. Nickel has not been available during the war for use as coinage and it has also been restricted for most uses of nickel silver. More than 8 per cent of all nickel consumed in the year preceding the war is estimated to have gone into electroplating. All decorative applications of plating have been discontinued under war conservation measures. Consequently the consumption of nickel for electroplating has been cut.

War production of rolled nickel, Monel, Inconel, and other high nickel alloys at International Nickel's plants in the United Kingdom, and at Huntington, W. Va., is expected to be substantially more this year than in 1943, which was about twice that of 1937—the highest peacetime level. United Nations armies are large users of these nickel alloys, but larger amounts go to their navies which have been substantial peacetime customers. Cupro-nickel, used for pipe and tubing for naval construction, continued at a high rate of production this year and military airplane production has created a large demand for Inconel and the 18-8 stainless steels.

LONGEST GAS PIPE: *This pipe line 1265 miles long starts at Corpus Christi, Tex. and ends near Cornwall, W. Va. To protect the pipe from corrosion, it is first wrapped before it is laid in the trench. The crew up ahead is coating it with coal tar enamel as it climbs the hill.*

•

Metals Required for B-29

• • • **The present production program** of the B-29 superfortress will require 15,000 tons of copper, 120,000 tons of aluminum and 175,000 tons of steel for completion, it was said recently by Brigadier General Frederick M. Hopkins, Jr., Chief, Resources Div., Materiel and Services, Army Air Forces.

These materials are required for the production of planes at the Boeing Aircraft Co. plants at Seattle and Wichita, Kans., the Bell Aircraft Corp. plant at Marietta, Ga., and the Glenn L. Martin Co. plant at Omaha, Neb. They are also required for engines made by the Wright Aeronautical Corp. at Paterson, N. J., and Lockland, Ohio, and by Chrysler's Dodge Bros. Corp. plant at Chicago.

•

Mercury

• • • **The price of mercury** continues to increase and is now being quoted delivered New York at a price of $125 to $127 per flask. This price represents a considerable rise from the low of $97 recorded a few months ago but it is possible for buyers to purchase only small quantities in this range. The Metals Reserve Co. is releasing mercury from its stockpile for urgent requirements.

Primary Metals

(Cents per lb., unless otherwise noted)

Aluminum, 99+%, del'd. (Min. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be.	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$4.50
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	$125.00 to $127.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52s, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

†*(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)*

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4†

Refinery brass	4.75*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S	3.00
25S	3.50
turnings, dry basis	2.50
Low copper alloys 51, 52, 61, 63S solids	5.50
turnings, dry basis	3.50

Plant scrap, mixed

Solids	3.00
Turnings, dry basis	2.00

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	4.50
Old castings and forgings	3.75
Pistons, free of struts	3.50
Pistons, with struts	2.00
Old alloy sheet	3.50

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

Zinc

New zinc clippings, trimmings	6.00
Engravers, lithographers plates	6.00
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¾
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00-13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz. lots	40.82-41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc, cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Turnings Continue to Rise

• • • Increases in blast furnace grades are the most significant development in the scrap market this week and in many districts these grades are just under ceilings. There are also upward readjustments of many other scrap grades and differentials between open hearth grades have now been eliminated.

The volume of business reported by the market districts seems to be rather small except in a few districts and this seems to be the result of the first snows reported and the fact that mills may not be prepared to pay the rapidly advancing prices for scrap which had been purchased a short time ago at much lower quotations.

Scrap dealers of the Baltimore-Norfolk-Washington area have gone on record as condemning over-ceiling bids on government offerings of scrap and favoring the ultimate return of all carbon-free overseas and battlefield scrap as ballast. The sentiment of dealers was that, where bids are received on government scrap, as has been the case recently at several navy yards, which offer prices over the OPA ceiling, the government should accept no more than the ceiling, even though technically there is no ceiling on dealers' buying prices.

•

PITTSBURGH — The scrap collections in this area have practically dried up because of the heavy snows and cold weather that hit this area last week. Meanwhile prices have climbed to ceiling in all grades except the turning items. Before the week is out these grades are expected to be pegged at top OPA prices. The war news of the past few days will also tend to bolster up prices.

•

DETROIT—Despite the heavy fall of snow last week, there was some increase in volume of shipments late in the week and early this week. Apparently the reaching of ceiling prices for open hearth, cast and electric furnace grades brought out supplies which would not have reached the market otherwise. Machine shop scrap continues well below ceiling, however. Some factors in the market here anticipate higher prices on turnings and borings later, figuring that shortages of heavier grades may bring about increased use of light stock in the open hearths.

•

ST. LOUIS—Heavy melting steel went back to the ceiling price of $17.50, at which base sales were made to several mills in the St. Louis industrial district. Cold weather has further slowed up the movement to this market, making the shortage of material more serious. Railroad lists include St. Louis-San Francisco, 20 carloads, and Missouri, Kansas, Texas, 13 carloads. Of the two lists only one carload was melting steel.

•

CLEVELAND — Local mills have not been buying much in any grade, so most scrap is moving into other districts, especially Youngstown where ceiling prices are being paid. On the basis of present inventories little buying is expected here until after the first of the year.

•

BUFFALO—Furnace scrap prices advanced again last week under the impact of renewed buying by the chief mill interest. Contracts for approximately 15,000 tons were made by this consumer under OPA specifications, a departure from the more rigid requirements set up when the market was down. Commissions were not paid on this business, but the increase ran as high as $2.25 per ton. Ceiling was paid for No. 1 melting, $19 for No. 2, $18 for No. 2 bundles, and $14.75 for shoveling turnings which had been quoted previously at $12.50. Bundling capacity has been sharply reduced recently by fires which knocked out two hydraulic presses in yards of leading dealers. One, hit late last month, will be back in operation shortly, but the other probably will be out of commission for several weeks. Demand for electric furnace and foundry materials has slowed down appreciably without affecting their ceiling status.

•

PHILADELPHIA — All grades except turnings continue at ceiling prices. With the turnings prices so close to ceiling, $13.00 to $13.50 for machine shop turnings, it is likely that by the close of the week, ceiling levels will be reached. Mills are accepting more liberal quantities but the accumulations in dealers' yards which were awaiting highest prices have disappeared.

•

NEW YORK — Open hearth grades continue to be bought at ceilings in the New York market, and turnings are moving up to ceiling levels. Differentials between open hearth grades have been wiped out. It is reported that the holiday season is slowing market activity.

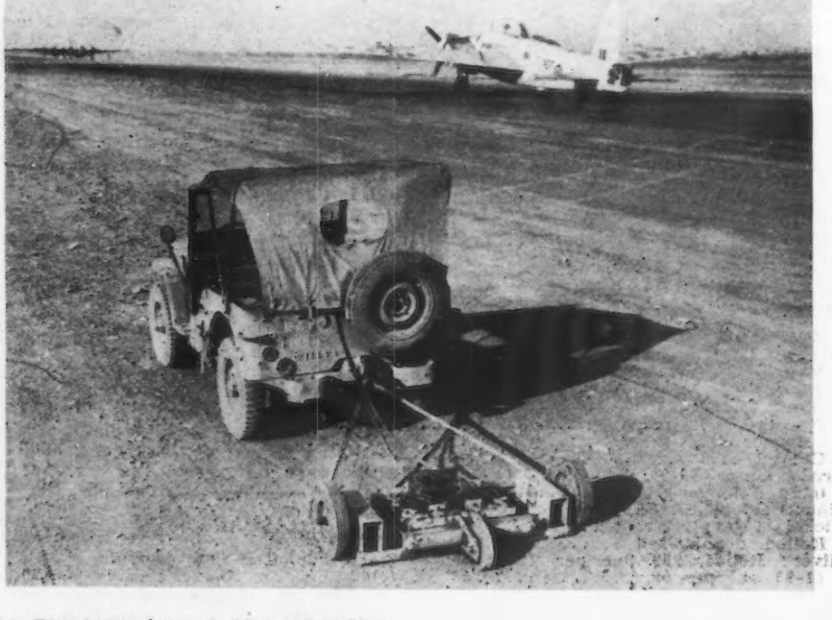
•

BIRMINGHAM—Although there is no advance in prices here from a recent sharp rise, open hearth grades have a firm undertone that indicates a possible further increase. Little interest is being shown for foundry grades at any advanced prices, but there is still substantial demand for blast furnace material.

•

CHICAGO—Last week's B mill buying so far has proved to be nothing more than a series of short hypodermic jabs insofar as dealer items are concerned and it still remains doubtful whether prices paid in these and in broker-dealer transactions will be attained in future mill sales. Heavy industrial and railroad items remain strong but efforts to boost the price of the least desirable open hearth and blast furnace grades appear to be based on nothing more substantial than hope.

ENGINEERS' INGENUITY: *Fragmentation bomb slivers, relics of Allied bombardment when fields were in enemy hands, have a way of working through runways to ruin plane tires. This magnetic sweep devised by engineers' units cleans the field daily.*



Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00
RR. hvy. melting	21.00
No. 2 hvy. melting	20.00
RR. scrap rails	21.50
Rails 3 ft. and under	23.50
No. 1 comp'd sheets	20.00
Hand bdld. new shts.	20.00
Hvy. axle turn.	$17.50 to 18.00
Hvy. steel forge turn.	17.50 to 18.00
Mach. shop turn.	13.50 to 14.00
Short shov. turn.	16.00 to 16.50
Mixed bor. and turn.	13.50 to 14.00
Cast iron borings	16.00 to 16.50
Hvy. break. cast	16.50
No. 1 cupola	20.00
RR. knuck. and coup.	24.50
RR. coil springs	24.50
Rail leaf springs	24.50
Rolled steel wheels	24.50
Low phos. billet crops	24.45
Low phos.	22.50
RR. malleable	22.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75
No. 2 hvy. melting	$17.75 to 18.75
No. 1 bundles	18.75
No. 2 dealers' bndls.	17.50 to 18.25
Galv. bundles (No. 3)	13.75 to 14.25
Mach. Shop turn.	10.00 to 10.50
Short shoveling turn.	10.25 to 10.75
Cast iron borings	10.25 to 10.75
Mix. bor. & short turn.	10.25 to 10.75
Low phos. hvy. forge	23.75
Low phos. plates	21.25
No. 1 RR hvy. melting	19.25 to 19.75
Reroll rails	22.25
Cut rails, 3 ft. and under	22.25
Locomotive tires, cut	22.25 to 22.75
Cut bolsters & side frames	19.75 to 20.25
Angles & splice bars	22.25
St'dard stl. car axles	25.25 to 25.75
No. 3 steel wheels	20.75 to 21.25
Couplers & Knuckles	21.50 to 22.00
Miscellaneous rails	20.25
Agricul. malleable	21.00 to 21.50
RR. malleable	22.00
No. 1 mach. cast	20.00
No. 1 agricul. cast	20.00
Cast iron car wheels	20.00
Hvy. breakable cast	16.50
RR. grate bars	15.25
Brake shoes	15.25
Stove plate	19.00
Clean auto cast	20.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.00 to $18.50
No. 2 hvy. melting	17.00 to 17.50
No. 1 bundles	18.00 to 18.50
No. 2 bundles	16.00 to 16.50
Mach. shop turn.	6.50 to 7.00
Shoveling turn.	8.00 to 8.50
Cast iron borings	8.50 to 9.00
Mixed bor. & turn.	7.00 to 7.50
No. 1 cupola cast	21.00
Hvy. breakable cast	16.50
Low phos. plate	20.50 to 21.50
Scrap rails	20.00 to 21.00
Stove plate	16.00 to 16.50

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05
No. 2 hvy. melting	15.05
Busheling	15.05
No. 1 and 2 bundles	15.05
Turnings, shovelings	$8.50 to 9.50
Turnings, regular	6.50 to 7.50
Mixed bor. & turn.	6.50 to 7.50
Clean cast, chem. bor.	13.06 to 14.15
Delivered to fdry. per gr. ton	
Breakable cast	21.57 to 21.87
Stove plate	20.00 to 23.51
Machinery cast, truck	21.00 to 23.51

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32
No. 2 hvy. melting	17.32
No. 1 bundles	17.32
New busheling	17.32
Mach. shop turn.	$7.75 to 8.25
Short shov. turn.	10.75 to 11.25
Cast iron borings	10.25 to 10.75
Mixed bor. & turn.	7.75 to 8.25
No. 1 cupola cast	20.00
Charging box cast	15.50 to 16.50
Hvy. breakable cast	14.00 to 15.00
Stove plate	18.50 to 19.00
Flashings	17.32
Low phos. plate	18.50 to 19.82
Automotive cast	20.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75
No. 2 hvy. melting	18.75
No. 2 bundles	18.75
Mach. shop turn.	$13.00 to 13.50
Shoveling turn.	14.50 to 15.00
Cast iron borings	13.00 to 13.50
Mixed bor. & turn.	13.00 to 13.50
No. 1 cupola cast	20.00
Hvy. breakable cast.	16.50
Cast, charging box	19.00
Hvy. axle, forge turn.	17.00 to 17.50
Low phos. plate	21.25
Low phos. punchings	21.25
Billet crops	21.00 to 21.25
RR. steel wheels	23.25
RR. coil springs	23.25
RR. malleable	22.00

ST. LOUIS

Per gross ton delivered to consumer:

Hvy. melting	$17.50
No. 1 locomot'e tires	$17.50 to 18.00
Misc. stand. sec. rails	19.00
Railroad springs	19.50 to 20.00
Bundled sheets	13.00 to 13.50
Heavy axle turn.	14.00 to 14.50
Machine shop turns.	7.50 to 8.00
Rerolling rails	21.00
Steel car axles	21.00 to 21.50
Steel rails under 3 ft.	21.50
Steel angle bars	18.50 to 19.00
Cast iron car wheels	20.00
No. 1 machinery cast	20.00
Railroad malleable	20.00 to 20.50
Breakable cast	16.50
Stove plate	17.00
Grate bars	15.25
Brake shoes	15.25

Note: Cast grades f.o.b. Shipping Point.

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$16.00 to $16.50
No. 2 hvy. melting	16.00 to 16.50
No. 2 bundles	15.00 to 15.50
No. 1 busheling	13.50 to 14.00
Scrap rails	17.00 to 17.50
Rails for rerolling	19.00 to 19.50
Rails 3 ft. & under	19.00 to 19.50
Angles & splice bars	18.00 to 18.50
Long turn.	5.50 to 6.00
Cast iron borings	8.50 to 9.00
Steel axles	16.00 to 16.50
Stove plate	17.00 to 17.50
Bar crops and plate	17.00 to 17.50
Structural and plate	17.00 to 17.50
No. 1 cast	20.00 to 21.00
Cast iron carwheels	13.50 to 14.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00
No. 2 hvy. melting	20.00
Low phos. plate	22.50
No. 1 busheling	20.00
Hydraulic bundles	20.00
Mach. shop turn.	13.50 to 14.00
Short shovel. turn.	16.00 to 16.50
Cast iron borings	15.00 to 15.50

NEW YORK

Dealers' buying prices, per gross ton, on cars:

No. 1 hvy. melting	$15.33
No. 2 hvy. melting	15.33
Hyd. comp. black bundles	15.33
Hyd. comp. galv. bundles	13.33
Hvy. breakable cast.	16.50
Charging box cast	19.00
No. 1 cupola cast	20.00
Clean auto cast	20.00
Unstrip. motor blks.	17.50
Stove plate	19.00
Clean chem. cast bor.	14.33
Mach. shop turn.	8.50 to 9.00
Mixed bor. & turn.	8.50 to 9.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25
No. 1 bundles	$18.50 to 19.00
No. 2 bundles	17.50 to 18.00
No. 2 hvy. melting	18.50 to 19.00
Mach. shop turn.	10.50 to 11.00
Shoveling turn.	14.25 to 14.75
Cast iron borings	11.00 to 11.50
Mixed bor. & turn.	11.00 to 11.50
No. 1 cupola cast	20.00
Stove plate	19.00
Low phos. plate	21.75
Scrap rails	20.00 to 20.25
Rails 3 ft. & under	22.75
RR. steel wheels	23.75
Cast iron car wheels	20.00
RR. coil & leaf sprgs.	23.75
RR. knuckles & coup.	23.75
RR. malleable	22.00
No. 1 busheling	18.50 to 19.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
Compressed sheet stl.	19.50
Drop forge flashings	$18.50 to 19.00
No. 2 bundles	19.50
Mach. shop turn.	14.50
Short shovel.	16.50
No. 1 busheling	19.50
Steel axle turn.	17.50 to 18.00
Low phos. billet and bloom crops	23.66
Cast iron borings	15.50
Mixed bor. & turn.	14.50
No. 2 busheling	17.00
No. 1 machine cast	20.00
Railroad cast	20.00
Railroad grate bars	15.25
Stove plate	19.00
RR. hvy. melting	20.50
Rails 3 ft. & under	23.00
Rails 18 in. & under	24.25
Rails for rerolling	23.00
Railroad malleable	22.00
Elec. furnace punch.	21.50 to 22.00

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$16.00 to $16.75
RR. hvy. melting	16.00 to 16.75
No. 2 hvy. melting	15.00 to 15.75
No. 2 bales	14.00 to 14.75
No. 3 bales	10.00 to 10.75
Mach. shop turn.	7.00
Elec. furn 1 ft., under	16.00 to 17.50
No. 1 cupola cast	20.00 to 22.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.00 to $15.00
No. 2 hvy. melting	13.00 to 14.00
No. 2 bales	12.00 to 13.00
No. 3 bales	10.00 to 10.50
Mach. shop turn.	5.00
No. 1 cupola cast	20.00 plus frt.

SEATTLE

Per gross ton delivered to consumer:

No. 1 hvy. melting	$13.50
RR. hvy. melting	13.50
No. 3 bundles	11.50
Elec. furn. 1 ft., und.	$16.00 to 17.00
No. 1 cupola cast	20.00

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*.

(Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: (Cents Per Lb.)	Dec. 19, 1944	Dec. 12, 1944	Nov. 14, 1944	Dec. 21, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Dec. 19, 1944	Dec. 12, 1944	Nov. 14, 1944	Dec. 21, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	25.11	25.11	25.11	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	31.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$16.25	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	15.50	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	16.50	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	12.00	17.85
Low phos. plate, Youngs'n	22.50	22.25	17.75	22.50
No. 1 cast, Pittsburgh	20.00*	20.00*	20.00*	20.00
No. 1 cast, Philadelphia	20.00*	20.00*	20.00*	20.00
No. 1 cast, Chicago	20.00*	20.00*	20.00*	20.00

*F.o.b. shipping point.

Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$7.00	$6.50
Foundry coke, prompt	8.25	8.25	8.25	7.50

Non-Ferrous Metals: (Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

The various basing points for finished and semi-finished steel are listed in the detailed price table, pages 145-153.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
December 19, 1944	2.30837c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.30837c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.30837c. a Lb.	$23.61 a Gross Ton	$16.08 a Gross Ton
One year ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	HIGH	LOW	HIGH	LOW	LOW	HIGH
1944	2.30837c., Sept. 5	2.272349c., Jan. 4				
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$19.17, Apr. 10	$22.00, Jan. 7
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	16.04, Apr. 9	21.83, Dec. 30
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	14.08, May 16	22.50, Oct. 3
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	11.00, June 7	15.00, Nov. 22
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	12.67, June 8	21.92, Mar. 30
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	12.67, June 9	17.75, Dec. 21
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	10.33, Apr. 29	13.42, Dec. 10
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	9.50, Sept. 25	13.00, Mar. 13
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	6.75, Jan. 3	12.25, Aug. 8
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	6.43, July 5	8.50, Jan. 12
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	8.50, Dec. 29	11.33, Jan. 6
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	11.25, Dec. 9	15.00, Feb. 18
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	14.08, Dec. 3	17.58, Jan. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 0.10¢ per lb. under base; primes 0.25¢ above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50¢. (14) This base price for annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2 90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5 00						$5.10					5.36¢	5.32¢
.25 / .50 / .75 Electro Tin Plate, Box	$4.35 / $4.50 / $4.65	$4.35 / $4.50	$4.35 / $4.50 / $4.65						$4.60 / $4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2 15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Toledo = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton = 2.70¢)					2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3 67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)			(Duluth = 2.65¢)		3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47; Pgh. Steel Co. (reroll) $38.25, (forging) $44.25. Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth.

Sheet bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill. Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. 4 in. sq. or larger $37.75, smaller $39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2 $40.60 Kokomo, Ind. (thse prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.60 Birmingham; Ford Motor Co. $34 Dearborn, Mich. Geneva Steel Co. $58.64 f.o.b. Pac. C. Pgt. Steel Co. $43.50.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts. (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing points.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. and Geneva Steel Co. $3.20 Pacific Ports; Central Iron and Steel Co. $2.50 basing points; Granite City Steel Co. $2.35 Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co., $2.35 Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill. Milton Mfg. Co. $2.75 f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel Corp., Benwood, $2.05 per cwt.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago, base, f.o.b. Fort Worth, Tex.; Conors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co. $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-40 Ann.
**Philadelphia	3.518	4.872[8]	5.018[a]	3.922	4.772	3.605	3.668	3.822	4.072	5.966	7.066	7.272	8.322
New York	3.590	4.613[3]	5.010	3.974[6]	4.772	3.768	3.758	3.853	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.00[4]	3.70	4.65[917]	3.609	3.681	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.48	5.257[4]	3.86	4.35[17]	3.811[3]	3.811[3]	3.761[3]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[2]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.813[18]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.171[8]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

MILL EXTRAS FOR NATIONAL EMERGENCY STEELS

Designation	Basic Open-Hearth		Electric Furnace		Designation	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 1330	0.10¢	$2.00	....	.....	NE 9415	0.75¢	$15.00	$1.25	$25.00
NE 1335	0.10	2.00	....	.....	NE 9417	0.75	15.00	1.25*	25.00
NE 1340	0.10	2.00	....	.....	NE 9420	0.75	15.00	1.25	25.00
NE 1345	0.10	2.00	....	.....	NE 9422	0.75	15.00	1.25	25.00
NE 1350	0.10	2.00	....	.....	NE 9425	0.75	15.00	1.25	25.00
					NE 9427	0.75	15.00	1.25	25.00
NE 8612	0.65¢	$13.00	$1.15	$23.00	NE 9430	0.75	15.00	1.25	25.00
NE 8615	0.65	13.00	1.15	23.00	NE 9432	0.75	15.00	1.25	25.00
NE 8617	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00
NE 8620	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00
NE 8622	0.65	13.00	1.15	23.00	NE 9440	0.75	15.00	1.25	25.00
NE 8625	0.65	13.00	1.15	23.00	NE 9442	0.80	16.00	1.30	26.00
NE 8627	0.65	13.00	1.15	23.00	NE 9445	0.80	16.00	1.30	26.00
NE 8630	0.65	13.00	1.15	23.00	NE 9447	0.80	16.00	1.30	26.00
NE 8632	0.65	13.00	1.15	23.00	NE 9450	0.80	16.00	1.30	26.00
NE 8635	0.65	13.00	1.15	23.00					
NE 8637	0.65	13.00	1.15	23.00	NE 9722	0.65¢	$13.00	$1.15	$23.00
NE 8640	0.65	13.00	1.15	23.00	NE 9727	0.65	13.00	1.15	23.00
NE 8642	0.65	13.00	1.15	23.00	NE 9732	0.65	13.00	1.15	23.00
NE 8645	0.65	13.00	1.15	23.00	NE 9737	0.65	13.00	1.15	23.00
NE 8647	0.65	13.00	1.15	23.00	NE 9742	0.65	13.00	1.15	23.00
NE 8650	0.65	13.00	1.15	23.00	NE 9745	0.65	13.00	1.15	23.00
					NE 9747	0.65	13.00	1.15	23.00
NE 8712	0.70¢	$14.00	$1.20	$24.00	NE 9750	0.65	13.00	1.15	23.00
NE 8715	0.70	14.00	1.20	24.00	NE 9763	0.65	13.00	1.15	23.00
NE 8717	0.70	14.00	1.20	24.00	NE 9768	0.65	13.00	1.15	23.00
NE 8720	0.70	14.00	1.20	24.00					
NE 8722	0.70	14.00	1.20	24.00	NE 9830	$1.30	$26.00	$1.80	$36.00
NE 8725	0.70	14.00	1.20	24.00	NE 9832	1.30	26.00	1.80	36.00
NE 8727	0.70	14.00	1.20	24.00	NE 9935	1.30	26.00	1.80	36.00
NE 8730	0.70	14.00	1.20	24.00	NE 9837	1.30	26.00	1.80	36.00
NE 8732	0.70	14.00	1.20	24.00	NE 9840	1.30	26.00	1.80	36.00
NE 8735	0.70	14.00	1.20	24.00	NE 9842	1.30	26.00	1.80	36.00
NE 8737	0.70	14.00	1.20	24.00	NE 9845	1.30	26.00	1.80	36.00
NE 8740	0.70	14.00	1.20	24.00	NE 9847	1.30	26.00	1.80	36.00
NE 8742	0.70	14.00	1.20	24.00	NE 9850	1.30	26.00	1.80	36.00
NE 8745	0.70	14.00	1.20	24.00					
NE 8747	0.70	14.00	1.20	24.00					
NE 8750	0.70	14.00	1.20	24.00	NE 9912	$1.20	$24.00	$1.55	$31.00
					NE 9915	1.20	24.00	1.55	31.00
					NE 9917	1.20	24.00	1.55	31.00
NE 9255	0.40¢	$8.00	....	.....	NE 9920	1.20	24.00	1.55	31.00
NE 9260	0.40	8.00	....	.....	NE 9922	1.20	24.00	1.55	31.00
NE 9261	0.65	13.00	....	.....	NE 9925	1.20	24.00	1.55	31.00
NE 9262	0.65	13.00	....	.....					
					NE 52100A	....	.....	$2.60	$52.00
					NE 52100B	....	.....	2.60	52.00
					NE 52100C	....	.....	2.60	52.00

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. **Note 2:** For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, A.I.S.I. Steel Products Manual. **Note 3:** When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and $5 per gross ton for billets, blooms and slabs. **Note 4:** The extras shown are in addition to the base price of $2.70 for 100 lb. on finished products and $54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip, and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

([a]) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00

Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., $34.25; Pgh. Steel Co., $33.10.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., $38.10.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00

Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton $54.00

Price delivered Detroit $2.00 higher; E. Michigan, $3.00 higher.

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Price Exception: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

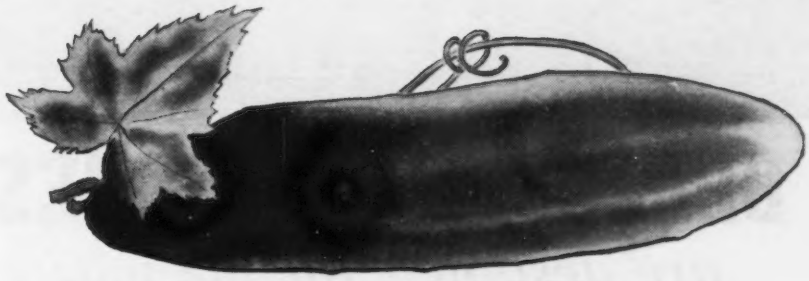
TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

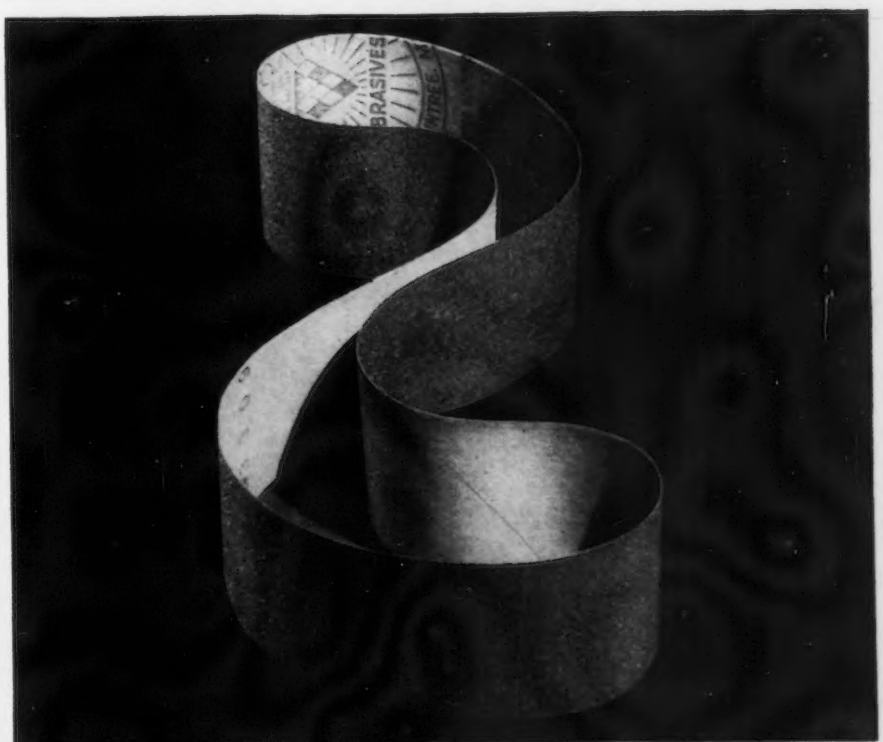
	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

COOL AS A CUCUMBER — because they're insulated, Silver Streak Metal-Working Cloth Belts run cool as a cucumber at grinding heats as high as 1700 degrees.

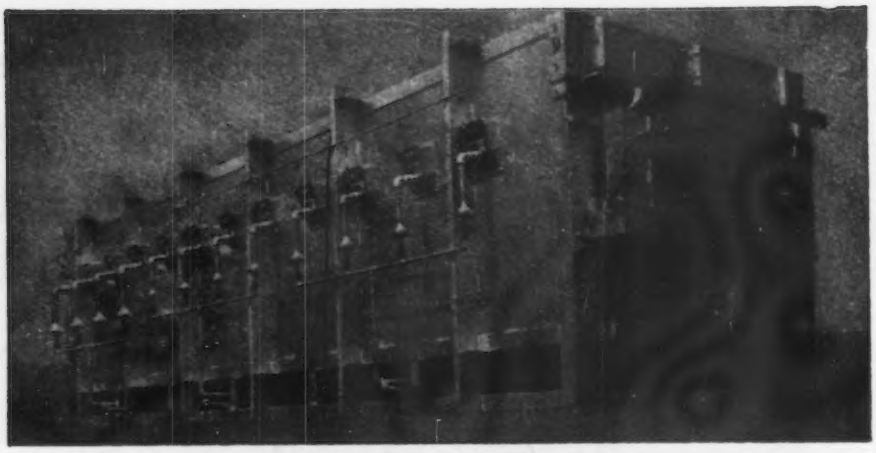


That's why they cut faster and cleaner . . . why they last longer than ordinary aluminum oxide belts. Equip your belt grinders with SILVER STREAKS — they cost no more! All grits — 50 and finer.



Abrasive Products, Inc.

SOUTH BRAINTREE 85, MASSACHUSETTS · MAKERS OF JEWEL COATED ABRASIVES



BELLEVUE FURNACES

are designed for the job.

In the construction of Bellevue Furnaces, painstaking consideration of the job to be done comes first. Every factor must be evaluated, every condition studied. Only then do Bellevue engineers attempt design and recommendation of furnace type.

The soundness of that policy is being demonstrated in plant after plant. Hundreds of executives in scores of varied companies have proved, to their own satisfaction, the efficiency, speed, high production level and operating economies of Bellevues that were "designed" for the job.

You, too, will find Bellevue experience and facilities a profitable investment for your own furnace needs.

Send for full details.

BELLEVUE INDUSTRIAL FURNACE CO.
2974 BELLEVUE AVENUE DETROIT, MICH.

"Plus or Minus...."

Those "tolerance" boys with the devilish micrometers sometimes want springs made to tight measurements···we just smile···and make them···but it adds plenty of "plus" to the cost. Lots of springs aren't so fussy···just good quality and easy tolerances···we make them, too···for less. We'll tackle your jobs-either kind-and try to give satisfaction because we want to be

"Everybody's Spring Dept."

DUNBAR
BROTHERS CO.
DIV. OF ASSOCIATED SPRING CORP.
BRISTOL, CONN.

SPRINGS · WIRE FORMS · SMALL STAMPINGS

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200.00 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	53½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	13
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	13
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.55	$3.05
Coated nails	2.55	3.05
Cut nails, carloads	3.85	....
	Base per 100 lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	.67	85
Fence posts, carloads	.69	.86
Single loop bale ties	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
3/16 & ⅝ in. x 6 in. & shorter	63½
⅝ to 1 in. x 6 in. shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 35c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Per Cent Off List*
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	86
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

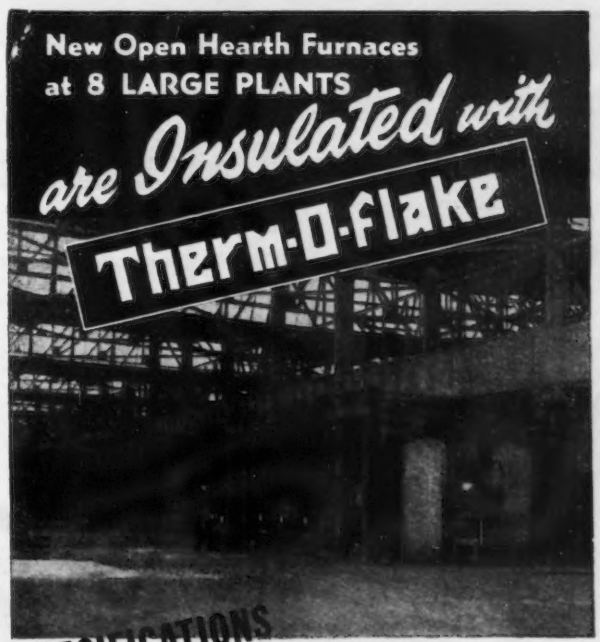
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
30-lb. coating I.C.	7.50	15.00

ANY METAL ANY PERFORATION

The Harrington & King PERFORATING Co.

5657 FILLMORE STREET—CHICAGO 44, ILL.
Eastern Office: 114 Liberty Street, New York 6, N. Y.



SPECIFICATIONS
for Greater Fuel Economy
Improved Working Conditions

Therm-O-Flake Coating Vertical walls — bulkheads — roofs — arches.

Therm-O-Flake Brick Flue Walls and Arch — Checker Chamber Walls. Slag Pocket Walls.

Therm-O-Flake Concrete Flue — Checker Chamber Hearth Bottoms.

Illinois Clay Products Company
JOLIET, ILL.

High Temperature INSULATION

PIG IRON

All prices set in bold face type are maximum established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maximum. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*	.....	.....
Brooklyn	*27.50*	*27.00*	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	$29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*25.11*	*24.61*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	*.....$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn., fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.63*	26.13	*27.1*	*26.63*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	...	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron & Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorus iron; high phosphorus sells for $28.50 at the furnace.

(3) E. & G. Brooke Co., Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

JOHNSON XLO
Music Wire
Among the thousand uses of Johnson XLO Music Wire — springs and wire forms in great variety. Quality product in full range of sizes from .003" to .200" dia.
JOHNSON STEEL & WIRE CO., INC.
WORCESTER 1, MASSACHUSETTS.
NEW YORK
AKRON
CHICAGO
LOS ANGELES

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21½ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe, carload lots	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges.

PRICES

REFRACTORIES
(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Sec. quality, New Jersey	51.00
No. 1 Ohio	43.00
Ground fire clay, net ton	7.60

Silica Brick

Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00

Chrome Brick

	Per Net ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plate, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.90c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F. Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

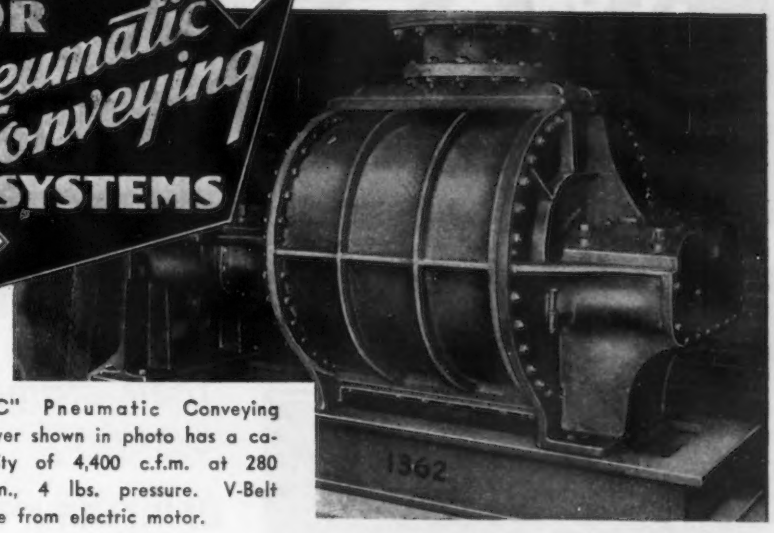
*Includes annealing and pickling.

ELECTRICAL SHEETS
(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

FOR Pneumatic Conveying SYSTEMS



"R-C" Pneumatic Conveying Blower shown in photo has a capacity of 4,400 c.f.m. at 280 r.p.m., 4 lbs. pressure. V-Belt drive from electric motor.

•

Write for Bulletin 22-23-B-11

"R-C" Positive Displacement Blowers are naturally adapted for pneumatic conveying systems because of their inherent ability to build up pressures needed to keep material moving in the conveying lines. Performance records show lowest power consumption. We specialize in building blowers to meet any capacity and moderate pressure requirement, but do not furnish complete systems.

ROOTS-CONNERSVILLE BLOWER CORP.
One of the Dresser Industries
412 Ohio Avenue, Connersville, Indiana

Roots CONNERSVILLE SINCE 1854 — *Rotary Positive* **BLOWERS**

FOR ALL TYPES of INDUSTRIAL FURNACES

A Gas Burner of improved design

• AIROCOOL •

This venturi inspirating type gas burner has many features that make it preferred for a wide range of furnace applications. It produces a flame of any desired degree of luminosity, having the highest heat liberation, with only a small amount of excess air.

Among its features are these: Low turndown without the flame flashing back; Maximum primary air inspirated; Close adjustment of the primary air-gas ratio; Gas orifice easily removed or changed.

Made in nine sizes, with rated capacities up to 11,000 cu. ft. per hour, per burner. Straight or angle mounting.

Another National Airoil Burner

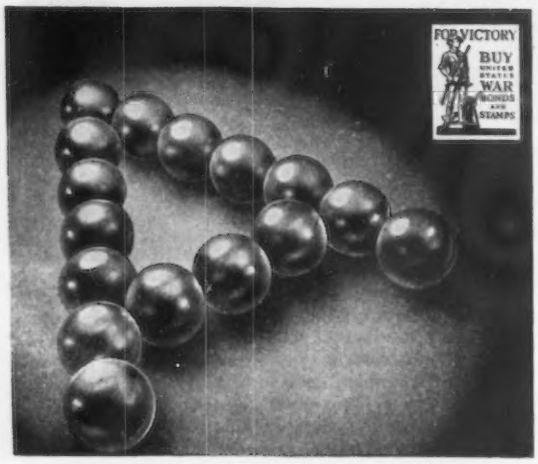
Cross-Section of Type SA Oil Burner

NATIONAL AIROIL FUEL OIL - GAS BURNERS

Steam Atomizing Oil Burners—Mechanical Pressure Atomizing Oil Burners—Low Air Pressure Oil Burners—Motor-driven Rotary Oil Burners—Industrial Gas Burners—Combination Gas and Oil Burners—Fuel Oil Pumping Units—Fuel Oil Heaters—Fuel Oil Strainers and other accessories.

NATIONAL AIROIL BURNER COMPANY, INCORPORATED
1271 East Sedgley Ave., Philadelphia 34, Pa.
ESTABLISHED 1912 *INCORPORATED 1917*

ROLL ON ABBOTT Bearing BALLS



BECAUSE--

their stamina assures

UNINTERRUPTED PERFORMANCE

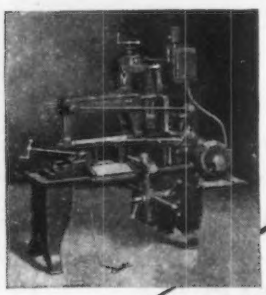
•

Specify "ABBOTT"

• CARRY THE LOAD AS PLANNED •

ROLL ON ABBOTT Bearing BALLS

THE ABBOTT BALL COMPANY HARTFORD, CONN. U.S.A.



Best!

FOR LIGHT DUTY

Speed!

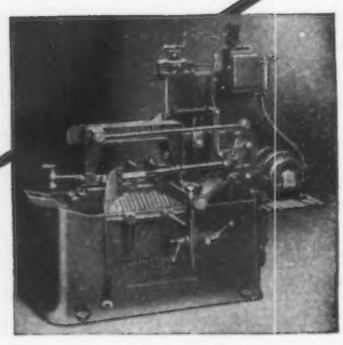
High Speed at Low Cost
No. 4B

For tool room, stock room, or, maintenance shop, this 6" x 6" capacity hack saw is superior to anything in its price class. Embodies similar design principles and features of MARVEL Heavy Duty production saws. Cuts a 2" standard pipe in 30 seconds—a 5" round piece of machine steel in 8 minutes!

MARVEL SAWS

2-Speed and 4-Speed

For applications where materials of different hardnesses and alloy characteristics are to be cut, MARVEL 4B is available in 2-Speed and 4-Speed models. Built-in work tracks for holding outer end of bars are also available for all models.



Complete Range of Metal Sawing Machines

Being the largest exclusive manufacturer of metal sawing machines and blades, both hack saw and band saw type, we have the correct answer to your cut-off problems. Each MARVEL model has a distinct application, so write us and we will send our catalog, price, and recommendation for the saw to fill your requirements most efficiently. MARVEL sawing engineers are also available to discuss and analyze your cut-off work. (Without obligation of course.)

ARMSTRONG-BLUM MFG. CO.

5700 W. Bloomingdale Ave., Chicago 39, Illinois, U.S.A.

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(C/L, Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.35c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.
62-66% Cr, 5-7% C	13.50c.	13.90c.	14.50c.

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads, Bulk	Ton Lots	Less Ton
0.10% max. C, 1 or 2% max. Si	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.35c.	10.75c.
Less ton lots	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	6.05c.	6.30c.	6.60c.
Ton lots	6.55c.	7.55c.	8.55c.
Less ton lots	6.80c.	7.80c.	8.80c.

Calcium—Manganese—Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carloads	15.50c.	16.00c.	18.05c.
Ton lots	16.50c.	17.35c.	19.10c.
Less ton lots	17.00c.	17.85c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast	Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots	2.30	2.80	5.75

Chromium—Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot ..... 45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.20	$1.2075	$1.229
Less ton lots	1.30	1.3075	1.329

Manganese—Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern Zone	Central Zone	Western Zone
11,200 lb. or more	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.0125	2.0445
Less ton lots	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more.... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.

Open hearth	$2.70
Crucible	$2.80
Primos	$2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal..... $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5..... $1.10

Ferroboron, contract basis, 17.50% min., Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.

2000 lb. to carload	$1.20
Under 2000 lb.	1.30

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)

Carload lots	25c.
2000 lb. to carload	26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)

Carload lots	58c.
2000 lb. to carload	59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis

No. 1	87.5c.
No. 6	60c.
No. 79	45c.

Bortram, f.o.b. Niagara Falls

Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.

2000 lb. lots	$2.25
Under 2000 lb. lots	$2.30

Ferrotitanium, 40%-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti..

	$1.23
Less ton lots	$1.25

Ferrotitanium, 20%-25%, 0.10%C. max., ton lots, per lb. contained titanium $1.35

Less ton lots..... $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload..... $142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton..... $58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. ..... 80c.

Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales

Carload lots	14c.

Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy

Carload, bulk	4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.

Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.

Car lots	8.75c.
Ton lots	9.25c.

(*Advertisement*)

Pipe Refrigeration Coils Galv-Welded

By GEORGE H. OHMER
Chief Engineer
Dayton

• • • The expanded use of the Galv-Weld Process to eliminate rust and corrosion at the seams of welded galvanized sheets, shapes and pipes has found its way into the refrigeration industry in the installation of galvanized pipe refrigeration coils.

GALVANIZED PRESSURE TANK: *¼" steel plate head, fittings and welds have been regalvanized by the GALV-WELD PROCESS.*

These coils are put in small sections through the fish holes in Tuna Clippers and must be welded together. The pipe coils completely line the holds of these boats and during the fishing operation the fish come in direct contact with these refrigerated coils.

It has been found that the welds in the pipe can be easily regalvanized with Galv-Weld Alloy and that the labor cost of doing this work is considerably lower than for any other procedure.

Process engineers quite generally are taking a tip from the shipbuilding industry, which has been regalvanizing welds in sheet, plate and pipe, and are planning the postwar use of welded galvanized fabrication for products heretofore of riveted or bolted construction.

Such all-welded design has been made possible by the patented Galv-Weld Process, which, in brief, consists of the coating of the weld and the adjacent damaged area with Galv-Weld Alloy at the time of welding.

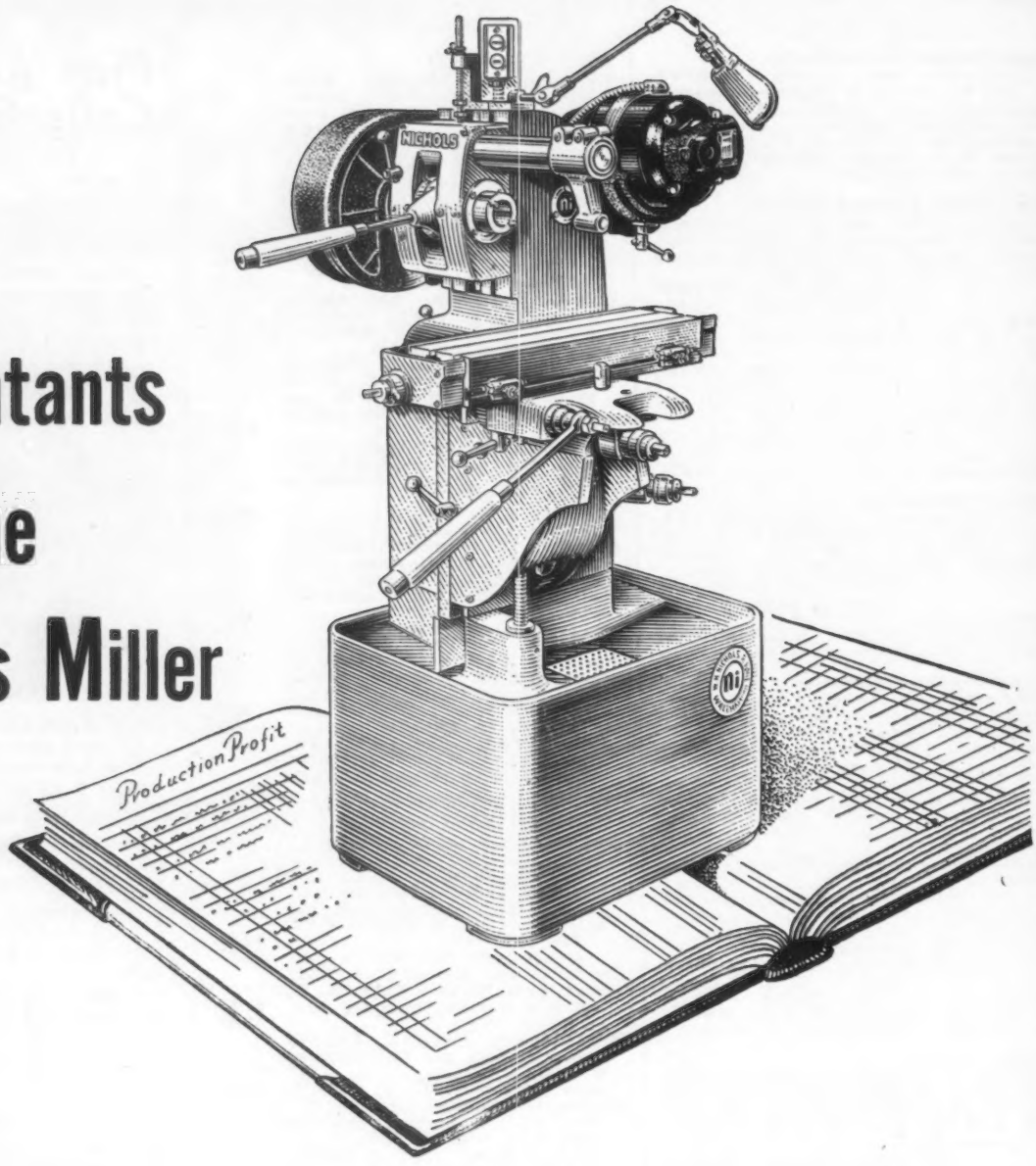
Heretofore, welded galvanized structures have been fundamentally unsound from the corrosion standpoint, since the protective galvanizing burned away at the point of and during the process of welding.

During one government test, Galv-Weld Alloy not only passed the standard salt spray requirement of 200 hours, or about eight days, but remained in test for a period of 141 days without failure.

Readily adaptable to gas, electric, carbon arc and spot welding, the Galv-Weld Process requires no flux in application and gives off no fumes. The alloy, which comes in bar form, may be applied in all positions, and in confined quarters. Once applied, the coating will not chip, crack or peel.

Complete details may be secured from Galv-Weld Products, Dayton 10, Ohio.

Why Accountants Like the Nichols Miller



He may not know a milling machine from a centerless grinder. But your accountant, because he keeps a watchful eye on the profit side of your production ledger, can appreciate the advantages of a machine that *quickly pays for itself*... the Nichols Miller.

Extra-utility is basic in the Nichols Miller's design. Starting with the fundamental principle of bringing the cutter on a sliding head down to the work, W. H. Nichols & Sons has engineered around it a machine tool that maintains *toolroom tolerances* in high-speed production, yet is sturdy enough to take on heavy duty jobs as well.

Simple, inexpensive fixtures and quick set-up keep Nichols Millers humming even in semi-skilled hands, through an extensive range of milling, boring, turning and facing operations. And it's not unusual to see it doing the work of expensive precision boring machines, lathes and grinders.. more economically.

Lathe carriage flexibility is an added production feature made possible by the Lever-Rack and Pinion Transverse feed, an exclusive Nichols development. Work can be chucked lathe-fashion on the spindle with tools mounted on table or vice-versa.

Equally at home in toolroom, laboratory or on the production line, the Nichols Miller is a profitable "operator." And you'll be surprised at its low initial and maintenance costs.

Our new photographic brochure will show you some of the many ways it can work for you. A post card will bring it to you promptly.

THE NICHOLS MILLER

"THE MILLER THAT USES ITS HEAD" • MANUFACTURED BY W. H. NICHOLS & SONS, WALTHAM, MASS.

NATIONAL DISTRIBUTORS: NICHOLS-MORRIS CORP., 46A Church St., New York 7, N. Y. *Dealers in all principal cities*